"Step after step the ladder is ascended."—George Herbert, *Jacula Prudentum*.
Agriculture is the most healthful, most useful, and most noble employment of man."—WASHINGTON

THE TROPICAL AGRICULTURIST:

(ESTABLISHED 1881.)

A MONTHLY RECORD OF INFORMATION FOR PLANTERS

OF

TEA, CACAO, COFFEE, PALMS, RUBBER, CINCHONA, SUGAR, FIBRES, COTTON, TOBACCO, SPICES, CAMPHOR, RICE,

AND OTHER PRODUCTS SUITED FOR CULTIVATION IN THE TROPICS:

Circulating in India, Ceylon, Burma, Straits, Java, Sumatra, Borneo, Northern Australia, Queensland, Fiji, Mauritius, Natal, East and West Africa, West Indies, South and Central America, California, Southern States, and throughout Great Britain.

EDITED BY

J. FERGUSON,

Of the "CEYLON OBSERVER," "CEYLON HANDBOOK AND DIRECTORY," "PIONEERS OF THE PLANTING ENTERPRISE," PLANTING MANUALS, "CEYLON IN 1903" (ILLUSTRATED), &c.

" It is both the duty and interest of every owner and cultivator of the soil to study the best means of rendering that soil subservient to his own and the general wants of the community; and he, who introduces, beneficially, a new and useful *Seed, Plant or Shrub* into his district, is a blessing and an honour to his country."—SIR J. SINCLAIR.

VOL. XXII:—Containing Numbers I. to XII.: July, 1902, to June, 1903.

CEYLON: A. M. & J. FERGUSON, COLOMBO.

LONDON:

JOHN HADDON & CO.; KEGAN PAUL, TRENCH, TRUBNER & CO., LTD.; LUZAC & CO., &c

MADRAS: HIGGINBOTHAM & CO. CALCUTTA: THACKER, SPINK & CO.
BOMBAY: THACKER & CO., LTD. AUSTRALIAN COLONIES: GORDON & GOTCH.
WEST INDIES AND CENTRAL AMERICA: C. H. CALDERON, ST. THOMAS.
STRAITS SETTLEMENTS AND EASTERN ARCHIPELAGO: JOHN LITTLE & CO., SINGAPORE.
HONGKONG AND YOKOHOMA: KELLY & CO. JAVA: MESSRS. JOHN PRYCE & CO.
BATAVIA: G. KOLFF & CO.

1903.

TO OUR READERS.

In closing the Twenty-second Volume of the "**Tropical Agriculturist**," we would as usual direct attention to the large amount of useful information afforded and to the great variety of topics treated in the several numbers. From month to month, we have endeavoured to embody in these pages the latest results of practical experience and scientific teaching in all that concerns tropical agriculture; and our ambition has been to make this periodical not only indispensable to the planter, but of service to business-men and capitalists, never forgetting that agriculture trenches upon every department of human knowledge, beside being the basis of personal and communal wealth.

While directing our attention chiefly to the products prominently mentioned on our title-page, we have always taken care to notice minor industries likely to fit in with sub-tropical conditions; and our readers have an ample guarantee in the index pages before them, that, in the future, no pains will be spared to bring together all available information both from the West and East, the same being examined in the light of the teachings of common sense as well as of prolonged tropical experience in this, the leading Crown and Planting Colony of the British Empire.

Special attention has, for a few years back, been given to the introduction and extension in Ceylon, the Straits, Burmah, &c., of an industry in rubber-yielding trees (more especially in the planting of Para and Castilloa trees), and much literature on the subject will be found throughout our pages; also on cacao in Central America and the West Indies as well as in Ceylon; to "Spices" of various kinds (nutmegs, camphor, &c.); to palms, especially "coconuts" in different districts; to coffee and allied products in Brazil, Mexico. Costa Rica, East Java, Nyassaland, British Central Africa; Liberian Coffee in Sumatra, Java, the Straits Settlements; and to other new developments in palms and tobacco planting, &c, in the Malayan Peninsula, Sumatra and North Borneo, as well as in this Island.

The Tea-planting Industry has sprung into so much importance in India (South as well as North) and Ceylon, as also in Java, that a considerable amount of space is naturally given to this great staple; and with reference to all Companies' Reports, to Sales and Prices, as well as to hints for economising, we think it will be admitted by impartial jndges that the *Tropical Agriculturist* should be filed, for the convenience of planters, in every Tea Factory in this Island, in India and in Java.

A full and accurate Index affords the means of ready reference to every subject treated in this, the Twenty-second Volume, which we now place in our subscribers' hands, in the full confidence that it will be received with an amount of approval, at least equal to that which has been so kindly extended to its predecessors.

To show how fully other Products besides Tea are treated in this volume, we may mention the number of entries under several headings as follows:—Coffee (including Liberian) 35; Cacao 40; Indiarubber 160; many besides to Gutta Percha; to Coconuts and other Palms, Rice and other Grain, Cinchona, Camphor, Cloves, Fibres, Tobacco, Fruits and Miscellaneous Products over 1,000. In the 22 volumes, the references to Rubber, Cacao and Coffee number many thousands, as also to Coconuts and other Palms.

A "Topical Index" to the twenty-two volumes is now in active course of preparation, and we trust to publish it before the close of the present year.

We are convinced that no more suitable or useful addition can be made to a Planting Company's Library or gift to a tropical planter or agriculturist, whether he be about to enter on his career, or with many years of experience behind him, than the twenty-two volumes of our periodical which we have now made available. They are full of information bearing on every department and relating to nearly every product within the scope of sub-tropical industries.

In conclusion, we have to tender our thanks to readers and contributors, and our wish that all friends many continue to write instructively and to read with approval; for then, indeed, must the "**Tropical Agriculturist**" continue to do well.

COLOMBO, CEYLON; 15TH JULY, 1903.

NOTICE.

THE interest and responsibility of Mr. DONALD WILLIAM FERGUSON of 20, Beech House Road, Croydon, in the "*Ceylon Observer*" and connected publications, and in our firm, ceased on the 30th June last.

A. M. & J. FERGUSON.

Colombo, 11th July, 1903.

MR. RONALD HADDON FERGUSON, B.A., has been admitted a Partner in our Firm as from the 1st instant.

A. M. & J. FERGUSON.

Colombo, 11th July, 1093.

[With reference to the above notice, we may mention that Mr. IVOR ETHERINGTON, with experience gained as Assistant Editor on "*The Farmer and Gardener*" in England, will henceforward take charge of the *Tropical Agriculturist*, and many improvements are contemplated during the coming year. One of Mr. Etherington's first duties will be to prepare the much-required "Topical Index" to the series of 22 volumes, so that the really valuable information in each set, can be made readily accessible. The Prizes offered for Essays based on the matter in the current volume, will, we trust, quicken interest in the "*T. A.*" and increase the number of its readers; and Advertisers should make a note of this.—A. M. & J. F.]

☞ All Planters of New Products or Pioneers in new lands should not fail to order this periodical as their best instructor.—Every Tea Factory, Coconuts or Cacao Store ought to have a file of TROPICAL AGRICULTURIST, which contains a vast amount of information about these products, and a Record of the Tea and other Produce Sales.

The Portraits and Biographies of some more OLD COLONISTS AND PLANTING PIONEERS are likely to appear in the Volume for 1903-04. In August's Number:—JOHN LEWIS GORDON.

ORDER FOR THE

"TROPICAL AGRICULTURIST."

....

....1903.

Sirs,

Please forward the above publication from the beginning of Vol. XXIII, *1st July, 1903.*

Please send also (lettered as for....................... ....Estate) Vols. I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XII, XIII, XIV, XV, XVI, XVII, XVIII, XIX, XX, XXI, AND/OR XXII, *for* 1881-2, 1882-3, 1883-4, 1884-5, 1885-6, 1886-7, 1887-8, 1888-9, 1889-90, 1890-91, 1891-2, 1892-3, 1893-4, 1894-5, 1895-6, 1896-7, 1897-8, 1898-9, 1899-1900, 1900-1901, 1901-1902, AND/OR 1902-1903,

I am, Sirs,

Yours faithfully,

....

To the MANAGER,

"CEYLON OBSERVER" OFFICE,

COLOMBO, CEYLON.

SUBSCRIBERS TO THE

"TROPICAL AGRICULTURIST"

are reminded that with the June Number, already received by them, and the Index and Title-page now issued, the TWENTY-SECOND VOLUME (1902-1903) is closed.

SUBSCRIPTIONS are due payable in advance for 1903-1904, at the following rates:—

For Ceylon and India	Yearly	Rs. 12	For Europe, &c.	Yearly £1 6.
	Half-yearly-	Rs. 7		Half-yearly 15s.

N.B.—Subscribers to the *Ceylon Observer* or *Overland Ceylon Observer* Rs. 4 (6s.) LESS per annum.

Single copies, Rs. 1; *back copies*, Rs 1½.
Per Bound Volume, Rs. 16; or £1 6s.

☞ Those who have not settled for past subscriptions are requested to do so by return of Post, and to send Cheque, Post Office Order, or Bank Draft in favour of A. M. & J. FERGUSON, Colombo.

Covers for binding the Twenty-second Volume, July 1902 to June 1903 (873 pages) can be obtained for Rs. 1·50. Cost of binding and cover Rs. 2·50.

WHAT IS THOUGHT OF

THE "TROPICAL AGRICULTURIST."

For cultivators of New Products, it is invaluable, telling us so much that is doing in other countries with the results of their work in Rubber, Fibres, Tobacco, Cotton, Camphor and other Spices, &c.—" Planter."

A gentleman resident in the Central Province, who has as good opportunities of knowing what is of benefit to Planters as anyone we know, sent us the following explicit testimony to the value of the " *T.A.*"—

" Since its commencement, I have regularly seen and perused the *Tropical Agriculturist.* There can be but one opinion that its scope and object are highly important, and that it supplies a distinct desideratum, which it is to the interest of every estate proprietor, to have available in the bungalow for the use of his *locum tenens*, or superintendent. As a magazine it provides varied and instructive fresh literature at intervals; deprived, as most in Ceylon are, of easy access to libraries; and as years go by it will growingly become 'The Ceylon Encyclopædia' with reference to agricultural operations. Viewing estate property as practically a permanent investment to any proprietor, the trifling charge of R12 per annum—a rupee a month—is certainly of no account, provided the separate numbers are kept and bound together yearly as a book of reference for the benefit of the manager and his successors. In that light, as the property of an estate to be handed over just as much as its office furniture, few proprietors would probably refuse to authorise its being taken and filed regularly (if the periodical was brought under their notice), more especially as on looking over the most recent volume one cannot fail to see how much valuable information on 'Tea' has been collated. In the belief that 'Tea' has restored prosperity to Ceylon, and that plantation property is a good investment for capitalists, such should not omit the office and connected equipment so advisable on all 'pucka' estates, a part of which should be the *Tropical Agriculturist.* I find I have gone on writing, but, as I am getting the numbers for the past year ready to be bound, the volume is before me."

THE VALUE OF THE " *T.A.*" to CEYLON ESTATE OWNERS.—A planting correspondent wrote some time ago:—" I think proprietors should supply every tea estate with the *T.A.* The information in it with regard to everything in connection with tea, &c. is invaluable; it would pay its value over and over again. Owners of estates should not leave it to hard-up superintendents to take it in."

A CORRESPONDENT WRITES:—" I venture to say the volumes of the *Tropical Agriculturist* will be at a premium a few years hence; it is a book which is bound to rise in value as time rolls on, and subscribers will probably, if they so choose, be able to sell at a handsome profit, besides having had the benefit of using the information in the meantime."

FROM A PROPRIETOR:— "I wonder how many planters know what they lose in not subscribing to your wonderful publication? The cost is absolutely nothing, compared to the convenience of having in a bound book all that is interesting and necessary in the literature of their calling. Information culled from a thousand sources, price lists of all produce sold locally, and home advertisements not seen elsewhere, and a hundred other things necessary for them to see and to know. The *T.A.* is, in fact, a convenient file of useful information daily arising and permanently preserved."

SIR W. T. THISLETON DYER, F.R.S., F.L.S., C.M.G., OF KEW GARDENS:—" Sir Joseph Hooker and myself always look out for the successive numbers of the *T.A.* with eagerness, and I keep a file in my office for reference. It is impossible to speak too highly of the utility of such a publication and of the way it is managed."

SIR GEORGE KING, LATE OF THE CALCUTTA GOVERNMENT MUSEUM: " I know your *Tropical Agriculturist* well, having carefully secured every number since the beginning. You have succeeded in making it a wonderfully useful magazine of information for planters."

SURGEON-MAJOR BIDIE, F.L.S., OF THE GOVERNMENT CENTRAL MUSEUM, MADRAS:—I find the *Tropical Agriculturist* a most interesting and useful publication. It finds a place on the table of our Public Library and is much prized."

The TROPICAL AGRICULTURIST

MONTHLY.

XXII. COLOMBO, JULY 1st, 1902. No. 1.

FURTHER OBSERVATIONS ON HELOPELTIS.

Circular and Agricultural Journal of the Royal Botanic Gardens, Ceylon, June, 1902.

AT the request of the Kelani Valley Branch of the Ceylon Planters' Association, I visited that district in March last and speut nearly a fortnight on an estate in Yatiyantota, where I had a favourable opportunity of studying the habits of the Helopeltis insect and its effect upon the tea plant.

My investigations on this occasion has shown me that much more work is necessary before an adequate knowledge of the pest can be acquired. I find that the breeding habits of the insect vary at different times of the year, and will necessitate differeut modes of treatment. Before a complete scheme of treatment can be offered, it will be necessary to have more accurate observations of the iusect throughout the year, and from differeut elevations and localies. At the end of the present paper I have suggested a few ways in which those interested in the matter could materially assist my work.

I now append the results of my investigations and experiments.

Having previously, on several occasions seen the pest at the height of its activity, I endeavoured to time my present visit to enable me to study the insect at the period of its least activity.

There has been a general idea that Helopeltis completely disappears at certain periods. Opinion of local observers varies on this point. Some Superintendents insist that the disappearance is complete; while others maintain that living specimens of the insect may be found, by careful searching, at any time. My own observations lead me to favour the latter supposition. There is no doubt, however, that there are usually two periods of comparative inactivity: the first, from the middle of March to the middle of June; the second duriug the months of September, October, and November. These periods vary both in duration and intensity. In 1901 reports from an estate near Dehiowita showed very little decrease of activity during the above-meutioned periods. In other years affected fields have apparently enjoyed periods of complete freedom; though it is almost certain that some of the insects must remaiu upon the bushes, possibly in a partially dormant condition. The conditions (climatic or other) that govern the periodicity of attack have uot yet beeu properly determined. Rainfall does not appear to be an important factor, as the two periods of greatest activity coincide, the one with a season of comparative drought (January, March), the other with a time of heavy rains (July, August). Wind has been suggested as a cause for the decrease of the pest, but I find that strong wind prevails only at one of these periods.

At the timo of my present visit the pest was evidently on the decline, *pro tem*, but the fields showed signs of recent severe attaok.

My first experiment was to try the effect of a powerful acetylene gas light. An apparatus supplied by Mr. E. B. Creasy, fitted with a burner of 50 candle power, was used for the purpose. The lamp was set up in a hollow where there was ample evidence of receut attack, and where specimens of the insects were being daily captured by hand. A dark still night was chosen, and all conditions were in favour of the experiment. The burner of the lamp projected from the centre of a basin filled with kerosine and water. Insects attracted by the light fell into the basin and were held and killed by the floating film of oil. The lamp was lit at 6.30 p.m., about half an hour after sunset, and remained burning until daylight next morning, when the surface of the liquid was found to be covered with a floating mass of miscellaueous insects. The work of sorting out and examining the catch occupied the whole of the

next day. There were representatives of nearly every family of insects :—Moths (*Lepidoptera*) ; Caddis-flies (*Trichoptera*) ; Beetles (*Coleoptera*) ; Earwigs (*Forficularia* ; Flies (*Diptera*) ; Parasitic Wasps (*Hymenoptera*); Termites (*Neuroptera*) ; Bugs (*Hemiptera*), both acquatic and terrestrial, including many species of *Capsidae*, a group to which the Helopeltis insect belongs, but not a single example of Helopeltis proper. I had not been sanguine of complete success, but the failure to capture even a single specimen of the enemy was a surprise and a disappointment. It seems evident that the Helopeltis insect is not responsive to attraction by light, though another trial must be made at a time when the pest is in full activity.

I am reserving experiments with a different kind of trap, something on the plan of the hopper-dozers used in America, for trial when the pest is in full activity. I have hopes that by the use of such an apparatus the insects may be captured much more effectually and economically than by hand.

As mentioned above, at the time of my visit the pest had been declining in activity for some weeks. The bushes bore evidence of an earlier severe attack on the mature leaves ; but young flush was beginning to come up freely, with only occasional signs of recent injury. An exhaustive examination of many bushes was made to ascertain whether eggs were still being deposited, and in what positions. For this purpose marked bushes were cut across, as in light pruning, and the prunings brought to the bungalow and examined— shoot by shoot, leaf by leaf, and bud by bud—in such a manner that not a single egg could escape detection. The result proved that very few eggs were being deposited at the time, and that a large proportion of those eggs have been deposited in such a position that they could have been untouched by plucking to the initial leaf. Some of the bushes examined had been so badly attacked (previously) that the shoots were small and brush-like, but others had a sufficient amount of new growth to form a possible nidus for the eggs. The larger number of the eggs found were empty. In the following figures only such eggs are reckoned as were judged (by their positions) to have been deposited within the previous month. The average works out at 7·66 groups (the eggs are laid in groups of two or three) per bush examined. Of these, 42 per cent. were above the initial leaf, while the remaining 58 per cent. were in such situations that close plucking would not have touched them. Besides the normal position in the succulent shoots, eggs were found embedded at the base of the unopened axillary leaf bud, and in the thickened base of the midrib of the leaf itself. The flower buds were carefully examined, but no eggs found in them.

The paucity of recently deposited eggs was the more remarkable when it was found that the insects that were being captured at the same time, by the "poochie podians," contained in their bodies a large number of fully-formed eggs than I had previously found in insects examined during the period of greater activity. The day's catch of one of these podians was critically examined. It contained twenty-one female Helopeltis insects and twenty-six males. Dissection of the males showed eggs ranging in number from seven to twenty, and giving an average of 12·25 per insect. My previous record had been eight eggs per insect.

Ten gravid females were confined in glass vessels and supplied with fresh tea shoots. They fed freely, but died on the second day. Examinations of the shoots showed that only one insect had deposited a single group of eggs during the period of captivity.

I can only surmise, from these facts, that this period of inactivity is marked by the retention of the eggs in the bodies of the female insects, to be deposited at some future time when conditions may be more favourable for breeding. How long they may be retained in this manner will be a subject for further investigation.

To test the vitality of eggs in prunings left on the ground, young shoots containing recently deposited eggs were placed in a cardboard box and allowed to dry up. None of these eggs hatched out. On another occasion, some eggs in which the embryo was more fully developed, produced larvæ after the shoot had become dry. I am of opinion, however, that little danger need be apprehended from the hatching of eggs from pruned branches. Such larvæ would find no young shoots upon which to feed, and would die of starvation.

The practical immunity of the indigenous varieties of tea remains established. A few cases of partial attack have been reported, but in all such cases it appears that it has been "shuck" trees, or patches of trees on poor soil, that have been affected. This might be expected, for an indigenious plant, growing under unfavourable conditions, would lose its characteristic free growth and free flow of sap, which is believed to account for its immunity. At the same time it is quite conceivable that the pest may gradually adapt itself to the conditions found in indigenous tea, if allowed the opportunity. Helopeltis insects, confined with shoots of indigenous tea only, will feed freely on them, but such unnatural conditions do not afford any sure guide to the probable conduct of the insects in the field. (When speaking of "Indigenous Tea," I refer both to the Indian varieties and to Singlo-indigenous, *i.e.*, the direct progeny of Indian plants grown in Ceylon.)

Although Helopeltis does not usually attack recently pruned tea, I have records of the return of the pest, in force, after the third tipping.

Search was made for other host-plants of the pest. I was informed that a certain shrub (afterwards found to be *Mussœnda frondosa*), growing amongst the tea, was sometimes punctured, but I did not see any such punctured plants myself. Examination of the jungle, on the edge of affected fields, failed to produce any reliable signs of the pest. Some spotted leaves of *Dalbergia championii* were observed, but these spots proved to be due to a fungous disease. I have since received leaves of a species of *Dillenia* (native name "Decapura") that have undoubtedly been punctured by some sucking insect, and the symptoms are very much those of Helopeltis attack. No eggs of the insects were, however, found in the specimens.

Helopeltis is extending its range in Ceylon. It formerly confined its ravages (as regards the tea plant) to estates situated in the low-country, *e.g.*, Kelani Valley, Kalutara, Udagama, Morawak Korale. I have recently investigated an undoubted case in the neighbourhood of Nawalapitiya, at an elevation of about 2,000 feet, and I hear of other affected estates in the same district. The pest promises to be as virulent here as at lower elevations. The same conditions were observed here as obtained in the Kelani Valley at the same season, viz., a marked paucity of egg-laying, with an exceptionally large number of eggs in the bodies of the female insects. Nine females were dissected, resulting in an average of 13·22 eggs per insect. There was no difficulty in finding recent signs of attack, and insects could be captured in considerable numbers, but I was informed that the pest had been on the decline since the commencement of March.

I have received the following particulars of the habits of Helopeltis in the Morawak Korale district. January to March is usually very dry and hot. Helopeltis has been very severe during those months. Heavy plumps of rain commence in the middle of March, when the flush outgrow the attack and shows little or no signs of injury. Another bad attack commences in June aud lasts into August, when strong south-west winds appear to check the pest. I am informed that on one estate Helopeltis was very severe last year, but had not re-appeared in 1902. No reason could be suggested for this disappearance. It is noticeable here, as in the Kelani Valley, that the first period of activity occurs in the dry hot season; while the recrudescence is coincident with contiuuous S. W. rains.

In the R. B. G, Circular No. 21 (on Helopeltis) I stated that we were without data of the uumber of moults undergone by the insect during its development, or of the time required for it to reach maturity. I have not yet been able to determine these points for our Ceylonese Helopeltis (*H. antonii*) on tea. But Dr. L. Zehntner of Java has supplied particulars for the insect that feeds on cacao in that country. Dr. Zehntuer speaks of it as *H. antonii*, but the Java insect has usually been described as a distinct species (*H. bradyi*). The duration of the different stages is given as six days for the egg stage, followed by five moults at intervals of two days each. The number of moults may prove to be the same in the case of our Ceylonese insect, but the duration of the several stages will probably be affected by different climate and food. For instance, I have repeatedly found that the egg stage of our tea Helopeltis occupies just ten days.

CONCLUSIONS AND SUGGESTIONS.

My recent investigations show me that, at this spring period of inactivity, the formerly advocated system of plucking to the initial leaf will have little or no effect in checking the pest. A similar condition may possibly obtain during the autumn period. It is most important that the egg-laying habit of the insect (*i.e.*, the quantity of eggs being laid, and the position in which they are deposited) should be accurately determined for every month in the year. It may then be possible to formulate some logical scheme of plucking to suit the varying habits of the insect. For the present, I must recommend the abandonment of close plucking. There is no doubt that that system tends to produce a brush-like formation of small shoots particularly suited to the tastes of the Helopeltis. A free succulent growth should be encouraged. Just as anything that tends to reduce the vitality of the "Indigenous" variety lays it open to attack, so any extra vitality in the hybrid or China "jats," producing a character approaching that of the indigenous plant, will iucline to make them distasteful to the pest.

At the same time nothing should be allowed to nterfere with the campaign against the insects themselves. The more carefully and thoroughly this work is carried on, the less will be the loss of crop. The average loss through Helopeltis has been estimated at 200 lb. per acre. Putting the profit ou that tea at 12 cents a lb., this means a loss of Rs. 24 per acre. This figure would cover, several times over, the cost of systematically catching the insects. The collection of the insects is even more important during the period of partial inactivity, for, as I have shown above, at such times the females contain the maximum number of eggs.

The more I see of the habits of Helopeltis on our tea estates, the more convinced I am that the work of checking this and other insect pests would be very greatly facilitated by breaking up the area into blocks of from 10 to 20 acres, divided from each other by narrow but compact belts of other trees. The insect does not fly high; its flight is weak, and, when on the wing, it is carried from place to place more by the wind than by its own wing power. I have frequently noticed the effect of au ordinary wind-belt iu limiting the spread of the pest. It would be possible to fight the pest in such isolated blocks one by one, with some assurance that they would not be immediately re-infected from neighbouring fields. Such a screen would almost certainly prevent the incursion of the pest into fields of indigenous tea. It would be necessary that there should be some thick undergrowth to complete the screen. In districts suitable for them, economic trees and plants might be employed for the belts. For the larger trees, Para rubber, Coconut, Nutmeg, or Kola-nut suggest themselves. For the undergrowth, Croton Oil, Annatto, Castor Oil, or Tapioca might be used. Or the screens might consist of trees and plants, the clippings of which would be suitable for green manure, such as Albizzia moluccana, or "Dadap" (Erythrina), with Crotalaria as an undergrowth. The tea plant itself, allowed to run up, would form a good undergrowth, and might bo used for seed production. Tea, grown in this manner, is little—if at all—affected by Helopeltis, which is dependent upon the constant supply of flush, occurring only on pruned bushes. But some other plant would be preferable.

To enable me to complete my investigations on the breeding seasons of the insect, and the position in which the eggs are laid at different times of the year, fresh (if possible, living) specimens of the insects, and the tops of a certain number of bushes, from selected estates, should be sent to me at regular intervals—say on the 15th of each month—for examination. I would suggest that four estates should be selected from different localities, and that the prunings of two bushes from each of these estates should be sent in regularly on the specified dates. Bushes that show the most recent signs of injury should be chosen. If the pest appears to have gone into retirement, bushes from the most lately attacked fields should be selected. The whole top of the bush should be cut off, as in pruning to a level, the prunings from each bush collected and tied up separately in sacking or jute hessian (slightly damped), and despatched by first train to "The Entomologist," R. B. Gardens, Peradeniya. It is important that the specimens should arrive in as fresh condition as possible. At the same time living specimens of the insects (about fifty from each estate), packed in tea sample boxes, should be posted to the same address.

E. ERNEST GREEN,
Government Entomologist.

Peradeniya, May 20, 1902.

DESICCATED COCONUT—AND OIL.

SEYCHELLES, 9TH JUNE, 1902.

(*The Editor, "Tropical Agriculturist," Colómbo.*)

SIR,—I am writing to ask if you, or any of your readers can give me information as to the process of dessicated cocoaut manufacture? What machinery is necessary and its probable cost? What would be the lowest number of coconuts dealt with per day to make it a paying concern at prices now ruling in

Ceylon? Can the manufacture of oil be carried on at the same time and in the same building as the desiccating process? I should be much obliged if you could give answers to the above questions.

I am, yours truly,

VANILLA.

[We would advise "Vanilla" to address one of our Machinery houses, say Messrs. Walker, Sons & Co., Ltd., The Colombo Commercial Co., Ltd., Colombo, as for the requisites in machinery required for desiccated coconut and the oil.—ED. *T.A.*]

FRUIT, SUGAR, TOBACCO, &c. IN JAMAICA.

From a paper read before the Society of arts by Mr. H. T. THOMAS, twenty-five years resident in Jamaica, we quote :—

The products of Jamaica are as numerous and varied as are its climate and degrees of temperature at various altitudes. Its soil is, in most districts, of wonderful fertility; and of it one may truly say that it has only to be tickled with a hoe to make it laugh with a harvest. A great number of those products now rot uselessly on the ground, and still await the touch of capital and enterprise to convert them into sources of wealth. *Oranges*, golden and luscious, grow wild. Only within the last six or seven years, since their value as an article of export has begun to be more and more realised, has any attempt been made at systematic cultivation, and improvement by budding and other processes. The sour *Seville oranges*, of whose rind the most delicious marmalade is made, literally wither on the trees or rot on the ground by millions year by year. The same is true in an even higher degree of the *guava*, the fruit from which the well-known luscious jelly is prepared. In some districts the tree is positively a noxious weed, and has to be cut down and cleared away by the acres to make room for cultivation of other products.

As a matter of fact, in spite of these circumstances, orange marmalade, manufactured in England or Scotland, and imported into Jamaica, can be purchased at a less price than the manufacture of the home-made article costs ; and the same would no doubt be the case with guava jelly, if the latter fruit could be procured at home, as oranges are, from other sources. The cause of this apparent anomaly lies in free trade, which has the effect of making the sugar necessary for these manufactures a more expensive article in Jamaica, where the sugar itself is made, than it is at home. And this brings us by a natural process to the discussion of *sugar* itself, and its concomitant, *rum*, which were once the staple of the island, but have now fallen on such evil times, owing entirely to the operations of the free trade principal, as to constitute jointly only 18 per cent of the total value of the exports. The decay of this industry cannot, I think, be more forcibly illustrated than by the statement that, whereas at the beginning of the 19th century there were upwards of 800 sugar estates in cultivation, there are to-day no more than 121. The famous rum of Jamaica, which is a house hold word, has been so largely superseded, even in the island itself, by whiskey, that it is now little more than a recollection and a name. There is, however, a particular description of rum which is only manufactured on certain estates in one district of the island, and which, although utterly unfit for human consumption in its natural condition, is much prized in the German market, and is eagerly bought up at prices which appear enormous when compared with those given for the ordinary kinds.

The place once occupied by sugar in the trade of Jamaica has now been completely usurped by fruit : first the *banana*, and then, a long way after, the *orange* and the *pineapple*. In the year 1875 the first load of bananas was taken away from Jamaica to the United States in a small schooner by a Yankee skipper. In 1879 the total value of the fruit exported from Jamaica was estimated at £40,000, while in the returns for 1899-1900 it is set down at £314,000. These bare figures describe the growth of the fruit trade more eloquently than any words possibly can do. And this trade is entirely the offspring of American enterprise. The Yankee skipper above-mentioned is now the head of the Jamaica branch of the gigantic concern known as the United Fruit Company, whose headquarters are at Boston, Mass., with offices in New York, Philadelphia, Baltimore, and numerous other places in the States, in Central America, and in the West Indies ; notably, since the termination of the Spanish-American War, in Cuba and Porto Rico. They own hundreds of thousands of acres of land in Jamaica, employ thousands of labourers, and use thousands of head of horses, mules, and cattle. They contribute thousands of pounds to the Inland Revenue and the Customs of Jamaica, over and above what they spend in wages, &c. Besides shipping their own fruit, they purchase millions of bunches from other growers, and in the busy season, which last from April to July, they despatch from twelve to fourteen steamers a week laden with fruit. They have laid down tramways, and strung telephone wires round half the island. They have converted the town of Port Antonio from a fishing village into a thriving, bustling, business centre. They have built a fine hotel there, on one of the loveliest spots in the whole island, and they fill it every winter with hundreds of tourists brought down from the States in their own steamers, whose money circulates in the island to the common benefit. They have prevented the eastern and north-eastern districts of the island, where the sugar industry fell into decay more rapidly than in any other part of it, from relapsing into the condition of a primeval African wilderness. In short, if there is one man in the world to whom the grateful inhabitants of Jamaica should erect an imperishable monument, that man is the Yankee skipper who took away that load of bananas in 1875.

The Americans are more a nation of fruit-eaters than the English ; and it is to this fact, and to their recognition of the actual food value of the banana, that the continued increase of the demand for it is due. It is becoming a common article of diet among the working classes ; and we hope to see the day before long when its value in this respect will be equally recognised in the mother country.

In this direction a determined and laudable effort was begun last year by a man who has been aptly described as a "Napoleon of commerce." He is now Sir Alfred Lewis Jones, K.C.M.G., the head of the firm of Elder Dempster & Co. He has built a small fleet of four steamers which ply direct between the port of Bristol and Kingston, Jamaica, making the voyage in twelve to thirteen days. By the terms of his contract, he is bound for a period of five years, to purchase in the land a minimum of 20,000 bunches of bananas every fortnight for sale in the United Kingdom. I well remember the interest and anxiety with which the

arrival of the "Post Morant," the pioneer vessel of the fleet, was awaited througout the island in February last, and the crowds which thronged the wharves to watch her progress up the harbour when her approach was signalled. It was felt that the links which bound the ancient British colony to the mother country, neglected and almost rusted through, were now being forged afresh, and that a new era was about to dawn. And I remember how eagerly the telegram was longed for which should announce the arrival of the ship at Bristol, and the condition of her cargo; and what a wave of relief and rejoicing swept through the island when news of the best was flashed across the wires. Since then the venture has made steady progress, and the fruit trade between Jamaica and England may be regarded as being established on a firm basis. Experience and resolution have corrected the faults and overcome the drawbacks inseparable from the initial stages of such an experiment, and the tide is steadily flowing, never again, let us hope, to ebb.

Not content with exploiting the fruit trade, Sir Alfred Jones has insisted on the advantages of Jamaica as a health and a winter resort— with which I shall deal later on—and has leased from the Government the two principal hotels of the island, placing them under such management that the tourists and invalids whom he conveys thither in his steamers may enjoy to as great a degree as possible the comforts to which they are accustomed at home.

The first-class return fare is only £32, and the voyage—in itself a pleasure and a substantial benefit to those in weak health—lasts but from twelve to thirteen days each way.

The principal disadvantage attending the cultivation of the banana is the danger of destruction by gales of wind that would not affect any other description of cultivation. Added to this is the careful handling which the fruit requires to prevent its being rejected by the buyers on account of bruises. On the other hand the profits are enormous and may be calculated at not less than from £9 to £10 per acre per annum. Thus damages by storm or flood can always be amply recouped within twelve months, the period which elapses between the planting of the sucker and the reaping of the mature fruit.

An excellent, nutritious. and easily digestible flower is made from the green fruit; and the development of this branch of the industry only awaits the discovery of some process by which it will be possible to produce the flour so cheaply as to enable it to compete with wheaten flour. When that shall have become an accomplished fact, millions of bunches which are now unmarketable and are thrown away, or given as food for pigs and other stock, will be turned to use aud profit.

Pineapples are now receiving great attention in Jamaica. Certain kinds of them bear transport better than any other description of frnit with which I am acquainted. Some fellow-passengers of mine brought over several in May last, simply stowed underneath the berths in the cabin, and on our arrival at Bristol, they looked as if they had been gathered the previous day.

The Jamaica orange is second to none in flavour and juiciness, especially the kind which grows—practically quite wild – in the parish of Manchester. Readers of Mr. Froude's "Bow of Ulysses," will remember his almost rapturous description of the Mandeville orange. The great bulk of this fruit is now shipped to the United States; and as already stated, it is being systematically cultivated. Experts who have been driven out of the state of Florida—Jamaica's chief rival in the American orange market—by repeated frosts, have migrated to Jamaica and turned their attention to the cultivation and packing of the fruit there. This product is also receiving its due share of attention at the hands of Sir Alfred Jones; and I have been greatly gratified by seeing in the fruiterers' shops in Bedford, Jamaica oranges which in appearance and flavour leave nothing whatever to be desired.

The cultivation of *cocoa* has very largely increased of late years. It is now planted, almost as a matter of course, in all the banana fields, where the bananas afford the young plants the shade which is indispensable to them for the first year of their existence. The same soil suits both, and the one cultivation does not interfere with the other in the slightest degree. At the same time the art of curing the cocoa is much better understood than was previously the case, and the Jamaica product is now steadily bridging the great gulf in price that not long since lay between it and the celebrated Trinidad cocoa.

Coffee has shared the fate of most other products, and suffered disastrously in competition with other producing centres of vast extent which are being opened up year by year; but the delicate Blue Monutain coffee, which is grown at high altitudes among the monntains, still maintains its reputation for unrivalled flavour, and has not been affected by competition in the same manner as the lower grades.

I am unable to assign any reason for the fact that the excellence of the Jamaica *tobacco* is not more widely known in the United Kingdom. It is a fact that as good a cigar, of local manufacture, can be purchased in Jamaica for twopence, as would cost at least sixpence in London. The manufactures of the island snpply it entirely with cigars, and to a great extent, with cigarettes, manufactnred almost exclnsively from native-grown tobacco, only the outer leaf or "wrapper" being imported; but it does not appear that any attempt has been made to establish export trade on a large scale. The tobacco trade has hitherto been exclusively in the hands of Cubans, who, driven from their own country by constant rebellions and Spanish oppression, have settled in Jamaica, in considerable nnmbers, most of them becoming naturalised as British subjects. Bnt this industry is now receiving the attention it deserves at the hands of a gentleman who brings to bear upon it not only wealth, bnt position and infinence. He is the Hon. Evelyn Ellis, uncle of the present Lord Howard de Walden, and a large land owner in the western part of the island. He has there established a tobacco plantation which is already the largest, under the control of any one man, in the world. Factories have been erected on the spot, and cigars and cigarettes are been turned out in large quantities. There is also a chemical laboratory in which highly skilled experts experiment with numcrous other products that now run to waste. There is not the least doubt that Mr Ellis's exertions will be of incalculable benefit to the island, especially if he takes up the mater of an export trade in cigars to the mother country. He it was who entirely revolntionsed the breeding of cattle for draft purposes in the island by importing stock from India to his magnificent properties of Jamaica, which, crossed with the native breed, make the most ideal draft oxen that can be desired. His herds now practically supply the

whole island, and his annual sale is a great event among the sugar planters in the western districts.

Another industry which has only very recently sprung into existence, and in the future of which I have great faith, is the cultivation of *rice*. Rice is very largely in use as an article of food among the negroes, and there are thousands of acres of swampy land, utterly useless for any other purpose, which might be profitably turned into ricefields. I myself witnessed the first experiment which was made in the vicinity of the town of Falmouth, on the north side of the island, and can testify both to its success as a commercial venture, and the improvement to the town effected by it from a sanitary and an aesthetic point of view.

CASSAVA POISONING.

Amongst the important food plants cultivated in the West Indies is the 'Cassava' or 'Manioc' *Manihot utilissima*, a member of the Spurge Order, or *Euphorbiaceae*), grown for the sake of the store of starch contained in its long, thick roots. Two kinds of cassava are commonly recognised, the 'bitter' and the 'sweet,' and sometimes considered to be two distinct species of plants. Bitter and sweet cassava are put to separate uses. From the bitter variety, after grating and careful expression of the milky juice, a flour is obtained from which thin cassava cakes are made. It is also the source of 'farine' and the tapioca of commerce. The raw juice cooked and concentrated is known as casareep. The sweet cassava is more commonly eaten, as a vegetable, after boiling or roasting. Bitter cassava in the fresh condition is well known to be harmful and experiments have been made which prove the extremely poisonous character of its milky juice. The poisonous constituent of the raw juice is prussic acid, or hydrocyanic acid, easily recognizable by what is known as the 'smell of bitter almonds. Prussic acid is fortunately a poison which it is comparatively easy to get rid of completely. It is only necessary to ensure that the substance containing it shall be thoroughly heated, and all the prussic acid present is destroyed and the substance rendered perfectly harmless.

As already said, bitter cassava is universally regarded as a poisonous substance. With regared to sweet cassava, on the other hand, opinions vary and even in a standard book of reference on Chemistry it is stated that 'the milky juice in the sweet variety is innocuous, whilst that in the bitter is highly poisonous.'

Deaths from eating improperly prepared sweet cassava occur from time to time in the West Indies, principally amongst badly-fed or neglected children. In order to prevent, if possible, the recurrence of such accidents, it is desirable that the actual facts should be published and made widely known in the hope that teachers and others may be able to put children on their guard against the danger of eating sweet cassava unless care has been taken in its preparation.

As long ago as 1877, Professor Francis, then Government Chemist at Trinidad, stated, as the results of experiments that sweet cassava root contained considerable quantities of prussic acid. His work has recently been repeated and extended by his successor Professor P. Carmody (*Annual Report of the Government Analyst, Trinidad*, 1901, p. 15). From their investigations it appears that sweet cassava not only contains the poisonous prussic acid, but contains nearly as much as bitter cassava, and that by mere chemical analysis it would be impossible to distinguish between the two. Professor Carmody was able to show that whilst in bitter cassava the prussic acid is distributed more or less uniformly throughout the tissues of the root, in the sweet cassava it is located chiefly in the skin and outer portion of the rind. It follows that in order to prepare sweet cassava so that it may be a safe food for human beings the following precautions should be taken:—

(1) Carefully scrape off the skin and outer portion of the rind, whereby the greater portion of the poison will be removed.

(2) Thoroughly heat the remainder by boiling or otherwise, so as to destroy and drive off any remaining prussic acid.

Thus prepared sweet cassava is a thoroughly wholesome article of food, as the experience of many who eat it regularly is sufficient to prove.

One other word of warning is necessary. Professor Carmody has indicated that although all the prussic acid originally present in the root may be got rid of, it is possible that a small further quantity may be formed later by changes dependent on the addition of water. Cassava which has been cooked and then kept for some time may still be a dangerous substance, and should not be eaten. The rules to be followed in preparing and eating sweet cassava are thus:—(1) Scrape the root. (2) Cook it well, so as to heat it throughout. (3) Eat cassava only after it has been freshly cooked.—*West Indies Agricultural News*

COMPOSITION OF THE BREAD FRUIT.

The following analysis of the bread fruit is recorded in the *Experiment Station Record*, Vol. xii, p. 1076:—

Water..	46·21	per cent.
Protein	2·34	„ „
Fat	0·40	„ „
Starch	41·42	„ „
Crude Fibre...	4·20	„ „
Ash	1·78	„ „
Undetermined	3·65	„ „

In comparison with the sweet potato and yam (which agree very closely with one another in their chemical composition) the bread fruit contains 25 to 30 per cent. less water, about 25 per cent. more starch and a distinctly higher proportion of protein or nitrogenous matter. Expressed in other words, whilst one pound weight of sweet potato or yam contains about twelve ounces of water and two ounces of starch, one pound of bread fruit contains about six and a half ounces of starch and only seven of water. Although superior as a food stuff so far as actual chemical composition is concerned, the presence of over four per cent. of fibrous matter in the bread fruit is a point in which it compares unfavourably with the sweet potato and yam.—*Agricultural News.*

RUBBER OUTPUT OF THE AMAZON VALLEY.—The United States Consul at Para reports that at the close of 1901, the receipts of rubber at Para were nearly 30 per cent. greater than ever before at that season. Business was good in 1900, exchange low, and credits easy. The labourers and middlemen indulged in many luxuries. The end of the season found the crisis at hand, exchange rising rapidly, the gatherers deeply in debt, and the price of rubber reduced 20 per cent. Now they are making a desperate effort to pay off this indebtedness and make a fresh start. They are getting a large proportion off their food from the streams and forests by hunting and fishing; they are purchasing only absolute necessities; and are working overtime to increase the crop and liquidate their bills. It was reported in December that there were on the way down the river, from the upper tributaries of the Amazon, about 700 tons more rubber than had ever before been shipped from that section in one season, and that there were at least 200 tons more to follow. About 30 small steamers and launches left Para and Manaos for the Acre, Jurua, Purus, and Beni rivers, and were due to return to Para in February. Altogether, adds the Consul, there is reason to believe that this season's rubber crop will exceed that of last year by a very considerable margin.—*Imperial Institute Journal.*

THE PURCHASE OF ARTIFICIAL MANURE.

The following is the first portion of a paper which appeared in the *Journal of the Board of Agriculture* for March 1902:—

There are three substances, and only three, that are valued in artificial manures, namely, nitrogen, phosphates, and potash. According, therefore, to the greater or less quantity of one or other of these substances the value of the manure will rise or fall. Some manures contain only one of these substances —for instance, nitrate of soda and sulphate of ammonia contain only nitrogen; super-phosphate, precipitated phosphate, and basic slag contain only phosphate; and kainit, sulphate of potash, and muriate of potash contain only potash—while other manures hold two substances of value, as in the case of bones, which furnish both nitrogen and phosphates, or saltpetre (very seldom used, however, as a manure), which supplies both nitrogen and potash. Only one class of so-called artificial manure, namely, Peruvian or other similar guano, contains an important amount of all three substances.

NITROGEN.

In price lists nitrogen is frequently expressed as ammonia. The relationship between the two substances is, however, a very simple one, and need occasion no difficulty or uncertainty: 17 lb. of ammonia always contain exactly 14 lb. of nitrogen, or what is the same thing from the farmers's point of view, 14 lb. of nitrogen are the equivalent of 17 lb. of ammonia. If, therefore, a sample of, say 'corn manure' is offered as containing 4 5 per cent. of ammonia, this is the same as saying that it contains 3·7 per cent. of nitrogen. Sometimes, though not often, the figure is made to look more attractive by being stated as sulphate of ammonia; but this also need cause no difficulty, if it be remembered that 66 lb. of this substance are equivalent to no more than 14 lb. of nitrogen and 17 lb. of ammonia. If, therefore, we take the above example, the figures mean one and the same thing, whether they are stated as 3·7 per cent. of nitrogen, or 4.5 per cent. of ammonia, or 17·4 per cent of sulphate of ammonia. But a manure merchant who failed to effect many sales for a fertilizer of ever so high-sounding a name on a statement of 1 per cent. of nitrogen 1·2 per cent of ammonia might be more successful with a certain class of buyer if he entered the nitrogen as equal to 4·7 per cent. of sulphate of ammonia, and yet the figures all represent the same fact. Under the fertilizers and Feeding Stuffs Act, 1893, the invoice must contain the minimum guarantee of nitrogen, stated as such.

PHOSPHATES.

Phospbates or phoshhate of lime may also be entered in an analysis or price list in several ways, but as a rule this ingredient is either stated as above or as phosphoric acid. In an invoice, however, the statement must be made as soluble or insoluble phosphates, as the case may be.

The relationship between phosphates or phosphate of lime, whether soluble or insoluble, and phosphoric acid is quite as simple as that between nitrogen and ammonia: 142 lb. of phosphoric acid always form 310 lb. of phosphate of lime, so that to convert the former into the latter one may multiply by 2·2 which, though giving an answer slightly above the truth, is quite accurate enough for all ordinary purposes.

If, therefore, the analysis of a manure is returned as 12 per cent. of phosphoric acid, it is equivalent to saying that it contains fully 26 per cent. of phosphates. Similarly 30 per cent. of phosphates is equal to nearly 14 per cent. of phosphoric acid.

POTASH.

Potash usually exists in manures in the two forms of sulphate of potash and muriate or chloride of potash. It takes 94·2 lb. of pure potash to form 174 2 lb of sulphate of potash, whereas the same amount of potash will form only 149·2 lb. of the muriate or chloride. In the former case, therefore, to convert potash into terms of sulphate of potash we multiply by 1·85, whereas in the latter case we multiply by 1·58. If, therefore, an analysis of, say, kainit is stated as 12·5 per cent. potash, that is equivalent to say that it holds over 23 per cent. of sulphate of potash: while muriate of potash guaranteed to contain 56 8 per cent. of potash is of about 90 per cent. purity.

Just as a buyer may sometimes be led into purchasing a manure through its nitrogen being expressed as sulphate of ammonia, so may the contents of potash be made to look more attractive by being stated as sulphate of potash. In an invoice, however, the potash must be stated as such.

The rules for approximately converting the various terms into their equivalents may be thus summarised:—

To convert Nitrogen into terms of Ammonia multiply by 1·2.

To convert Nitrogen into terms of Sulphate of Ammonia multiply by 4·7.

To convert Phosphoric Acid into terms of Phosphates multiply by 2·2.

To convert Potash into terms of Sulphoric of Potash multiply by 1·85.

To convert Potash into terms of Muriate of Potash multiply by 1·58.

Nitrogen and phosphates, and, to a less extent, potash, vary in effectiveness, and therefore, in value, according to their source or origin. Nitrogen is never so effective as when in the form of nitrate of soda. [See 'Note added' Ed.] It is not quite so active, and for some purposes not so valuable, when in the form of sulphate of ammonia, though under certain circumstances this somewhat slower action may be regarded as an advantage. Nitrogen in what is called the organic form is in its least active condition, though here again the rapidity and effectiveness of action vary greatly. Nitrogen is in the organic form in blood meal, fish meal, bones, shoddy, etc., and yet, as a source of plant food, blood meal is more active than these other substances. It is claimed as an advantage for slow-acting manures that they last longer, which is true; but one applies manures not to last, but to act. It is only where it is convenient to apply manure at somewhat long intervals, as in the treatment of orchards, that the more inert manures are worthy of much consideration.

As regards phosphatic manures, it may be said that while soluble phosphates are all alike active, there is considerable difference in the value of insoluble phosphates. The insoluble phosphate of bone meal, for instance, is less effective, and for most purposes less valuable, than the insoluble phosphate of basic slag, precipitated phosphate, or even dissolved bones. Some of the insoluble phosphate of the last manure has once been soluble, and has 'reverted,' and such phosphate is not much less effective than soluble phosphate. But raw bones as a manure have been longer known to British farmers than other forms of phosphate, and for this reason their price has kept relatively high.

[NOTE ADDED.]

With regard to the statements above relative to the superiority of nitrate of soda, as a source of nitrogen, to sulphate of ammonia, it must be remembered that the conditions which obtain in temperate regions are referred to. Experiments in Barbados have shown that sulphate of ammonia produces better results in sugar-cane cultivation than nitrate of soda. Sulphate of ammonia is changed by nitrification in the soil, into nitrate of calcium. Nitrification is very active in tropical soils, and this fact, together with the liability to loss by leaching in the case of nitrate of soda, may explain the superiority of sulphate of ammonia in certain tropical lands.—*Agricultural News.*

"THRIPS" ON CACAO IN GUADELOUPE.

Through the courtesy of Mr. Louis H. Ayme, United States Consul at Guadeloupe, a copy has been received of a translation of a report by M. Aug. Elot on the occurrence of 'thrips' on cacao in that island. This pest was the subject of an article, with figures of the young and mature insect, in the *West Indian Bulletin*, Vol. II, pp. 175-190, where its occurrence in Grenada, St. Vincent, St. Lucia and Dominica was noted, with a comprehensive description of its habits and distribution in Grenada.

M. Elot's report deals evidently with the same insect and, whilst showing that it has extended its range to Guadeloupe, describes an attack closely similar to that observed in some parts of Granada during 1900. In his summary, M. Elot says that the pest is pretty widely distributed among the cacao plantations of Guadeloupe; that the damage is sometimes insignificant, sometimes very great, according to the environment; that the best way of protection against the disease is found in seeking favourable conditions for the culture and in giving the plantations every care compatible with such culture, and then if, in spite of these, damage is caused by the insects the remedy is to be sought in spraying the trees affected with kerosene emulsion.

The attacks of 'thrips' in Guadeloupe are similar to those elsewhere, the amount of the damage being large or small according to circumstances. Evidently M. Elot's experience fully confirms the view that whilst careful treatment of the trees will do much to lessen or avert the attacks of the pest, the ultimate reliance must be placed in spraying. The question of spraying was very fully dealt with in the article on thrips referred to above, and whilst kerosene emulsion was recommended especially for spraying pods, rosin and other washes were suggested for general treatment. The insect can probably be regarded as a pest of cacao, always ready to become troublesome and cause damage whenever the conditions are favourable, either from drought or from neglect and wrong treatment of the trees.

Whether the pest will eventually become so destructive as to need extensive treatment on a large scale is doubtful, but cacao planters in Grenada, St. Vincent, St. Lucia, Dominica and Guadeloupe will need to be on their guard for signs of injury and use the spraying machine to check the increase of the insect whenever it becomes destructively abundant.

M. Elot's report states that the insect had been sent by him to Prof. Giard at Paris, who has named it *Physopus rubrocincta*. It was previously regarded here as belonging to the genus *Heliothrips*. Mr. Pergande of the U. S. Department of Agriculture, to whom the insect was referred for determination was of opinion that it constituted a new genus allied to *Heliothrips*.

Specimens of the insect were also sent to Mr. E. E. Green, who had previously recorded the occurrence of a thrips on cacao in Ceylon. In a letter of September 16, 1901, he states :—'I beg to acknowledge receipt of your specimens of the "Grenada thrips" This insect appears to be closely allied to the thrips affecting cacao in Ceylon. The larva and nymph of our Ceylonese insect are also distinguished by a transverse crimson band, which appears to be a striking feature in the early stages of the Grenada thrips.'

The geographical distribution, as known at present, is Grenada, St. Vincent, St. Lucia, Dominica, Guadeloupe and possibly Ceylon. It is not improbable that the insect will be found to occur in other parts of the West Indies and South America.—*West Indian Bulletin.*

FORESTRY IN INDIA.

[Yearly Forest Report, Madras, 1899-1900.]

SEVERE CRITICISM: WANTING TO KNOW ABOUT EUCALYPTS.

I have searched in this report, amidst the dreary waste of undiscussed and undigested figures, for information regarding the interesting growth of Australian trees on the Nilgiris. Eucalyptus I find referred to as if it were one tree, not a class of trees. Your readers are probably aware that there are about 150 species of Eucalypts with climatic requirements ranging from the tropics to that of the temperate zone. There are two or three species which flourish in Java: and Roxburgh refers to a Eucalyptus Moluccana, which was cultivated for some years in the Calcutta Botanic Gardens. These species flourish under the equator. Going polewards we find the last of this most remarkable genus of timber trees in a climate hardly differing from Devonshire in England—a little more snow in winter, and a little higher insolation. Nine tenths of the species of Eucalypts are worthless for timber purposes. A few, such as the W. Australian Jarrah and Karrie, the S. Australian sugar gum and Leucoxylon gum, and the E. Australian iron-barks, tallow-wood, and E. resinifera, together with E. rostrata of the dry interior, afford some of the most useful timber trees for out-door use, and whenever great strength is required. As I remember the Nilgiris (Now alas! nineteen years ago) only the least valuable kinds were grown there, but these were marvellous as regards celerity and vigour of growth. Since then a railway has been made to the Nilgiris, and this White-man's oasis thoroughly opened up. In Ceylon and many other countries the steel sleepers (which should never have been put down) are being replaced by hard wood, Eucalypt sleepers from Australia. One naturally, therefore, turns to the Madras report to see what is being done to grow these valuable Eucalypt timbers in the temperate climate of the Nilgiri plateau which is seemingly so well suited to them' The information afforded in the Madras Forest Report is miserably meagre. Thus we read that some Eucalypts have been planted in the plains of the North Arcot district which had failed, as might be expected. Some seedlings in nurseries on the Shevaroys were 2 inches high. "The trees of the different species of Eucalyptus in the Nilgiris were, on the whole, doing well." Surely the Madras Forest Department might do more, or tell us more of what was doing than this. Is it that its work is paralysed by the unfortunate system of dual control and divided responsibility ?

The Madras Board of Revenue describe this meagre report "as a full and interesitng one." No doubt it is full to the brim of figures. One is tempted to enquire what purpose is gained by printing *50 pages of figures and bald statements*. Would it not be better to place these in the archives of the Board of Revenue, and furnish to the Government of India, and to the public, an intelligible digest, thus following the course pursued in other large industrial concerns run on a business footing?—(D. E. H.) Cape Town, 6th September, 1901.—*Indian Forester.*

CULTIVATION OF TOBACCO UNDER TENTS.—We are informed that the cultivation of tobacco under tents is now being experimented with in Connecticut. The experiments were made orginally at the State Agricultural Station, as well as by private individuals, in the effect to raise wrapper-leaf tobacco of the Sumatran type in fields completely covered and closed in all round with thin cheesecloth. The result is declared to be perfectly satisfactory. If memory serves us aright, the experiment was tried some thirty-five years since at a place called Broxbourne, on the G.E.R., but only on a small scale, and was attended with a fair amount of success; netting of small mesh was used as a covering to the "pens"—*Gardeners' Chronicle.*

ANNUAL REVIEW OF THE RUBBER MARKET FOR THE YEAR 1901.

KRAMRISCH AND COMPANY., LIVERPOOL AND LONDON.

During 1901 the Rubber Market has not been characterized by heavy or exceptional fluctuations; it was again not a particularly satisfactory one for holders and importers of the leading grades, and although trade remained exceedingly active throughout the year, the values of all grades of Rubber at the close are less than a year ago, and Fine Para shows a further recession of 3d per lb, and other grades in proportion. The bulk of the stocks of Mediums has gradually been exhausted, although it must be admitted that the prices realised were exceptionally low and showed an enormous loss to the importers or holders and even the more recent imports were disposed of at prices which, not alone showed no profit, but in most instances the prices realised show a considerable loss. The imports of important Medium grades have fallen off considerably, and as the enquiry has increased for same we do not anticipate a further appreciable decline in values, as one ought certainly to advocate the encouragement of a substantial increase in the imports.

As regards the quality of Para Rubber, considerable grievance was again caused by the want of care in the proper selection of these grades, especially from the Island districts, and this has led to numerous disputes amongst contracting parties. Trade in Great Britain and with leading Continental Rubber works was fairly good and the stocks of raw material at the factories is not large, and in spite of the fact that deliveries have been exceptionally heavy the reported consumption of Fine Para exceeds that of previous years. The American market showed the position there not to be so strong except for the first few months, but generally speaking the Rubber trade has been busy and the only important speculative stocks are held by one leading American house, whose position at the close of the year was considered very precarious. Visible supply now of Para and Peruvian is 4,618 tons against 4.100 tons last year. This includes America with a stock of 2,005 tons against 1,200 tons last year.

Should the demand for Para Rubber continue good, the statistical position at the end of 1901 is certainly a very healthy one. The total for the year's crop (from July 1st to December 31st) amount to 13,680 tons, this means an increase of 2,400 tons, while against this the total increase of the visible supply gives us only about 480 tons, thus about 1,920 more tons have gone into consumption, this despite the fact that it is well known that the "invisible" supply is exceptionally small. Although grave financial difficulties were experienced by many holders of Rubber, the position of the Rubber market is fairly sound, and with constantly increasing consumption, Rubber must be considered very reasonable at present quotations.

PARA KINDS.—At the beginning of the year we had to record a brisk enquiry to Para grades, and business on a large scale resulted, but, owing to continued "bear" operations, prices quickly exhibited an important recession, and while Hard Fine PARA was quoted at the beginning of January at 3s 10½d, Soft at 3s 9d, NEGROHEADS, Scrappy at 2s 9½d, ISLAND at 2s 1¾d, CAMETAS at 2s 4d, PERUVIAN Ball at 2s 7½d, and Slab at 2s 2d, prices declined rapidly during the latter portion of the first month, and sales for forward delivery at a market decline were done on a large scale, with the result that prices for PARA grades receded about 3d per lb. by the end of the first three months. In America, Fine PARA was then sold as low as 3s 6d, Scrappies 2s 6¼d, ISLAND 1s 11d, Ball 2s 4d, and Slab 1s 11d per lb. We then began to receive the first advices from Para of probable shorts receipts, and some important buyers partly relying upon these reports bought large quantities, thereby causing considerable briskness; this improvement was actively maintained for a few weeks, and as high as 3s 10d to 3s 11d was paid for Fine during the middle of April. Other sorts were 2d to 3d per lb. dearer. Soon afterwards, however, the market again showed signs of weakness, the demand being somewhat dragging, and in July Hard Fine was quoted at 3s 8d, Soft 3s 6d, but a temporary reaction in August resulted in quotations again reaching 3s 10d to 3s 9d. We have then had irregular declines of 2d per lb, and in November Hard Fine was as low as 3s 5¾d, Soft 3s 3½d, the lowest of the year. Additional cable advices from Para of probable shorts receipts during the end of the year and the early months of 1902 brought about some recovery on less pressure to sell, and with very large deliveries and moderate receipts we close the year firmly with quotations of Hard Fine at 3s 6¾d and Soft at 3s 5¾d. NEGROHEADS continue to remain very scarce, Scrappy being quoted at 2s 9d, ISLAND (of which the greater portion is being shipped to America) 2s 1½d, CAMETAS 2s 2d, Ball 2s 6d and Slab 2s 0½d. The total amount of Rubber imported from Brazil shows a further increase of 3,200 tons and the total quantity exported from the State of Amazonas, including PERUVIAN via Iquitos and Manaos, is 4,000 tons against 3,100 tons. The PERUVIAN Fine imported has we think been better as a whole, but owing to the Rubber having arrived in most cases uncut and unselected before shipment new rules had to be adopted in order to provide for this altered mode of shipping this Rubber. The PERUVIAN Ball imported has not been up to the expected quality, and at the end of the year the standard of fair average quality was considered lower, although some nice clean Hard Balls when received did realise fairly good, and in some cases exceptional prices. The Slab continues to be of good serviceable quality, and the consumption of it is certainly spreading. BOLIVIAN kinds have been very fair, but the imports were not as large as last year. MOLLENDO again showed a remarkable improvement in quality, and consequently sold exceedingly well. From VENEZUELA via Orinoco the supply was less than last year and the quality not very attractive.

Imports of CEARA Scrap are smaller, but of these grades only the best qualities could be sold easily, others are dragging. Of MANICOBA kinds we received less, but quality was good, and prices realised were satisfactory. PERNAMBUCO and ASSAREE qualities have somewhat improved, but owing to the general decline of the Rubber market, the values of these classes receded considerably. There were not very important arrivals of good MANGABERIA, and although the stocks are considerably going down and available supplies very small, the prices realised for ordinary quality show an enormous falling off in price. The imports of MATTOGROSSO, in sympathy with PARA, showed similar fluctuations, although transactions were only spasmodic. CENTRAL AMERICA has again been conspicuous by a further considerable decline in its export of Rubber, probably owing to the continued political unrest existing in those parts, and the only Rubber reaching us comes from the COLUMBIA districts, but the quantities were very insignificant. The EQUATOR and GUAYAQUIL kinds sold readily, and the prices at the end of the year are only about a 1d lower than they were a year ago. Of course this refers to good qualities only. Inferiors and mixed kinds are much cheaper. The imports from HONDURAS, MEXICO and PANAMA were likewise very small.

AFRICANS.—As expected at the close of the previous year, the increase in imports of these descriptions was not only not maintained but showed a considerable and serious falling off, and we estimate the difference of imports from Africa to be about 2,000 tons below that of last year.

With the exception of silght spurts in April and again in August (in sympathy with Fine PARA,) the year 1901 has been characterised by an uninterrupted decline in AFRICAN Rubber, the only exception being

First SIERRA LEONE Niggers which are actually rather dearer than a year ago, while all other descriptions show a decline varying from 1d to as much as 6d per lb.

From ANGOLA we received 250 tons less, made up in shipments from BENGUELA of 1,250 tons, as against 1,500 tons in 1900. LOANDA 730 tons, against 678 tons (besides 200 Thimbles). Quality has been hardly so good. The CONGO has slightly increased, but the quality has seriously declined; about 5,300 tons, against 5,000 tons in 1900. The average price shows a very considerable fall because so much was of poor quality. The supply from SIERRA LEONE and FRENCH GUINEA has again fallen off, partly owing to the prohibition by the French authority of the exportation of dirty, wet, and inferior Rubber from CONAKRY. The quality being thus reliable has caused consumers to look on this kind with favor, and their appreciation is reflected in the price which is unusually high compared with other Rubbers, both AFRICAN and BRAZILIAN.

Quite an extraordinary decline in supply of GOLD COAST, ACCRA, LAGOS, &c. and only moderate from CAMEROONS, SIERRA LEONE, GABOON, &c. and small of SENEGAL. Prices of nice Hard only about 2d lower, but Soft common and Lagos fully 4d decline for the year. We no longer quote STRIPS and BISCUITS, the pressing of LUMP Rubbers being practically abandoned. Liverpool imports of WEST AFRICAN, 4,200 tons, against 5,140 tons in 1900 and 5,600 tons in 1899.

The CONGO FREE STATE has again increased its exports to Antwerp, but other kinds of African have gone there in reduced quantities, so that the total Antwerp imports show little change.

During January, AFRICAN Rubber met with a disappointing demand at rather easier prices. February and March were very dull and prices declined for most sorts, closing with lower values all round. In April, fairly good trade was done at rather better prices, closing however somewhat quieter. A moderately large business was done in May at irregular prices. Good SIERRA LEONE sorts were then well in demand, showing however little, if any, change in price, whilst Lump descriptions were ½d to 1d per lb lower. During June and July, African Rubbers met with a moderate to poor demand at generally lower rates, and only a comparatively small trade was dône at barely steady prices. The demand was better in August, especially for parcels of good quality which arrived from Sierra Leone. This position of the market was not maintained, and we see a constant falling off in the demand, which remained disappointing with only small business passing at generally lower rates, until the end of November, when quite a steady trade was done at generally unaltered and in some instances slightly increased prices. The demand continued to improve during December for all the better grades, and rather higher rates were paid all round.

EAST COAST OF AFRICA, (ZANZIBAR, &c).—The supplies of these descriptions have continued to gradually fall off, and to this must be ascribed the fact that at the close Red hard Rubber is only 1d per lb lower, but White and Common Ball Rubber declined about 4d per lb. LAMU BALL (MOMBASSA): The arrivals were not important although the quality was fair and good clean Rubber sold fairly well, prices, however, showing a decline of 2d for the year. NYASSALAND sent us some very good Rubber, but the consignments were small, and when they reached the market were brought up readily at fair to full prices. MADAGASCAR supplies were again on the decrease, and have only been about half of what they were last year, and values were consequently well maintained.

Imports from CEYLON were again insignificant, but whatever small quantity reached this market it proved very attractive, as the quality and condition continued to be excellent, and many buyers were anxious to secure even the small arrivals, owing to the specially clean condition of this Rubber. We confidently expect that if larger imports could be arranged a great circle of consumers would come in and pay full prices for these grades, especially if the quality be kept up. It would be advisable to encourage the planters and others interested in this product in giving particular attention to this most valuable Rubber. High prices were realised, and 3s 9¾d was recently paid for Fine and 2s 4d for the Negroheads. It is, of course, known that this Rubber should practically be of the same kind as the one coming from the State of Amazones, being grown from Para seed.

RANGOON and PENANG has also been in much reduced supply. Of the later description we practically received no further shipments this year, but in spite of this, all the old stocks held were most difficult of sale, and what was disposed of showed an enormous decline, and thus Rubber that was quoted at 3s 2d a little more than a year ago sold at about 2s 2d to 2s 5d per lb. according to quality. If good quality of these descriptions could be imported to sell at present rates, it is certainly worth encouraging, as with scarceness of good red Mozambique Ball, the demand for these Red Penang kinds would again grow gradually.

Small quantitities of ASSAM were shipped, but the quality was very poor and sandy, and consequently did not meet with any requirement or interest.

BORNEO.—Of this Rubber the supplies have not been excessive, but in sympathy with the general tendency of the market prices declined. These grades are still held for higher prices, and with a continuance of the lower quotations all round we must also look for much reduced values in these grades before one will be able to effect larger sales. PONTIANAK: Supplies were about the same as those of last year and sold readily, prices showing very little change at the close of the year.

Rubber from the FRENCH COCHIN CHINA and from LOWER CHINA have continued to sell well, the quality and condition of nearly all arrivals were satisfactory, and the small trade done must have been profitable to the importers.

JAVA Rubber and NEW GUINEA have been very scarce, but generally speaking these qualities were not in great demand, and quotations were only nominal.

BALATA.—We had reduced arrivals of these descriptions, and all the imports of these grades have met with a good demand, although at one time Block BALATA was as low as 1s 7d. The year closes with buyers at 2s and sellers at 2s 1d. Nearly the whole of the stock in first and second hand has been cleared off and gone into consumption, and all new arrivals are selling very readily at full prices. SHEET BALATA.—Owing to the increased consumption the prices have also gradually gone up, and the market closes with buyers at 2s 7d, showing 4d per lb advance for the year.

GUTTA-PERCHA.—The year opened with a very poor demand, and the market continued weak throughout almost the whole of the year. It was only during November that, owing to larger contracts for cables being placed, extensive buying orders appeared on the market, thus increasing values of GUTTA-PERCHA, and since then a fairly large business has been done. There seems to be every prospect of a continued good market, with fair prices being paid for good and desirable qualities of GUTTA-PERCHA.

THE "TAPPING OF RUBBER TREES."

The "Journal d'Agriculture Tropicale" (II., 1902, 99) contains an interesting contribution from the pen of M. Henri Lecomte to the question of the tapping of the rubber trees.

As I have repeatedly pointed out in these pages this important operation is at present carried out much in the same happy-go-lucky style so characteristic of the crude rubber industry. But it is quite obvious that the manner in which the incisions are applied to the trunk of the rubber tree must be of

considerable importance as regards the yield of rubber milk obtained. In other words, the application of the incisions should be based upon a knowledge or the anatomical structures, at least of the laticiferous tissue of the various trees.

On the example of Landolphia Hendelotti, M. Lecomte illustrated this point. This is a creeper which furnishes the bulk of the rubber of the tropical regions of French North Africa. On producing a cross section through one of the branches of this plant, it may at once be seen that the laticiferous tissue is situate in that part of the bark which is nearest to the wood. It is therefore quite necessary to penetrate into the wood with the incisions.

The laticiferous vessels of this Landolphia run in comparatively straight vertical lines along the bark, and they are, to a moderate degree, only ramified and anastomosed (inter-communicating). From this it follows at once, that longitudinal incisions, however extensive, must prove very ineffective, the number of vessels thereby opened being very small indeed. On the other hand, it will easily be recognised that horizontal incisions lay open the maximum number of vessels which may be reached by any single incision, and thus must produce the greatest possible yield of latex. Of course, there is the objection to horizontal incisions that they do not lend themselves so readily to the collection of the latex by the simplest means. This difficulty is, however, easily avoided by producing these incisions at an obliquity just sufficient to induce the flow of the exuding latex towards a channel common common to a number of such incisions.

There is another important advantage in these transversal incisions which is worth calling attention to. In consequence of the constant increase in bulk of the ligneous core which is surrounded by the bark, the latter is under very considerable tension, and exerts a corresponing pressure upon the whole of the tissues. This tension of the bark, which exists in every tree, can easily be demonstrated by cutting an annular band from the bark of some tree, and then trying to place it again into poison, when it will be found impossible to make the ends of this band meet.

It is exactly this tension which causes the flow of the latex from the laticiferous vessels in which it is held by capillary action. Now it is perfectly clear that vertical incisions, apart from laying open very few laticiferous vessels, must in a large degree have the effect of relieving that tension with the result that capillary attraction maintains the upper hand, and we obtain only a feeble flow of latex. From these various points we arrive thus at the conclusion that horizontal, or transversal encisions are the most rational. Nevertheless, it should be borne in mind that by making such incisions indiscriminately all over the trunk of a tree the latter would very soon become worthless for tapping purposes. Each transversal incisions severs of course the connection between a large number of laticiferous vessels, which, when the incision has again healed up remain separated, so that if these incisions are made in an unsystematic manner they very rapidly result in dividing the whole of the laticiferous area of the bark into a number of disconnected sections, each of which is capable of a very restricted yield of latex only,—*India-Rubber and Gutta-Percha Trades' Journal.*

PREPARATION OF COMMERCIAL PAPAIN.

It is well known that the milk obtainable especially from the fruit, of the papaw tree (*Carica Papaya*,) possesses the property of rendering meat tender and in fact of partially digesting it. In recent years this property has been utilized by evaporating the milk into a dry powder known as ' papain. ' There is a moderate demand for this substance and where the papaw tree is abundant it might be advantageous to prepare it. The following account of preparing crude or commercial papain has been contributed by the Hon'ble Francis Watts, F.I.C., F.C.S. :—

The preparation of crude papain is a comparatively easy matter, provided that attention is paid to certain matters of detail.

COLLECTING THE MILK.

The juice, or milk, which forms the starting-point is procured by making a scratch or shallow incision in the skin of the fruit of the papaw while in a green condition. It is desirable to employ a bone or wooden knife, like a paper-knife, for the purpose. The milky fluid rapidly exudes and may be caught in a cup held beneath the fruit. After a time the flow diminishes and the liquid coagulates in the neighbourhood of the incision, this is carefully removed by means of the bone or wooden knife and placed in the cup with the milk already collected.

The fruit is not removed from the tree and is may be subjected to the oparation of tapping several times at intervals of two or three days. It is essential that no iron knife, or iron utensils, should be brought into contact with the milk. Wood or bone should be employed, and the milk should be collected in earthenware basins or cups, or in glass vessels, and not in tins, which are sure to blacken it.

After collecting the juice soon becomes coagulated and then should be in the form of a snow-white curd, possessing a somewhat pungent, but not putrid smell. It speedily decomposes if not rapidly dried, and, when decomposing, emits a most unpleasant odour. It is necessary then that drying should be effected as speedily as possible. When considerable quantities are being prepared, the collection of the juice or milk should be undertaken in the early morning and the drying should begin before midday. This ensures that by evening the material is in a sufficiently dry condition to keep without deterioration until the following morning when the drying can be completed.

DRYING THE MILK.

The drying may be effected in several ways. In dry, hot weather the coagulated milk may be placed in thin layers on sheets of glass and exposed to the sun. This, however, is rarely satisfactory on a large scale, and it is best to adopt some form of drying apparatus. Drying is well effected by spreading the coagulated milk on drying frames made by stretching brown linen on light wooden frames, somewhat like those used for framing school slates: these may be of any suitable size to fit the drying apparatus employed.

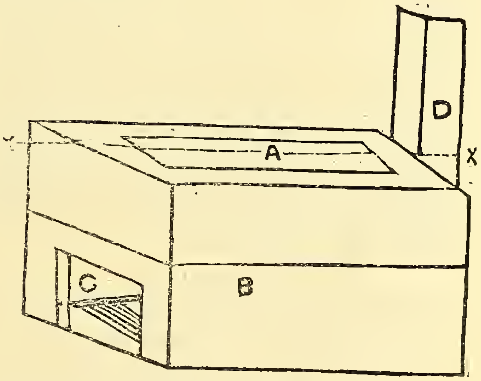

FIG. 1. Elevation.

A small American fruit drier will answer very well, or a drying-stove (Fig. 1) may be constructed by building, in brick, a chamber about 3ft. high, 3ft wide and 6ft. long, these domensions can be changed in accordance with the amount of material to be dealt

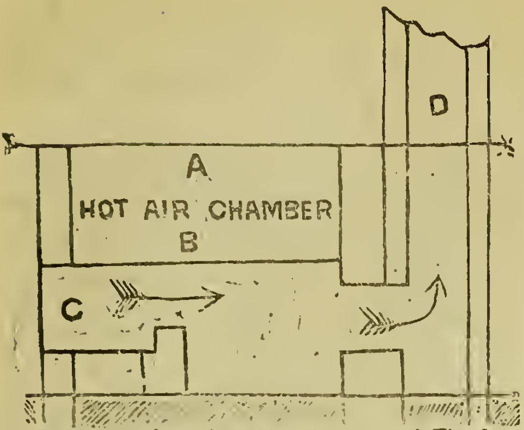

FIG. 2. Section along the line x. x. of Fig. 1.
FIGS. 1 AND 2. DRYING STOVE, FOR THE PREPARATION OF PAPAIN.

(A). Opening, across which the drying trays are supported. (B). Iron plate, (C). Fire Grate. (D). Chimney, with). This is open at the top. About a foot from the top the chamber is divided horizontally into two compartments by a sheet of iron, (B.) and below this division a small fire grate (C,) is constructed; at the opposite end from the grate a chimney (D). is placed to lead the smoke from the lower compartment. (Fig. 2.) In order to obtain an even heat in the upper compartment it is well to spread a layer of sand, one or two inches thick, over the iron plates. The frames carrying the coagulated milk are placed on the top of the chamber, so as to form a lid or cover to the opening (A.) when heat from the iron plate drives off the moisture at a low temperature.

It is important that the temperature at which drying is effected shall be as low as possible. Any over-heating destroys the active principle, so that a carelessly prepared product may be useless. In practice, the temperature is kept as low as is consistent with getting the substance dried before decomposition sets in: if this can be done without the temperature of the tray being raised above 100 deg. Fahrenheit so much the better.

As the substance becomes dry it shrinks considerably in bulk. The contents of several trays may now be emptied into one and the drying continued. The trays emptied are ready to receive another day's supply of fresh material.

Drying must be continued until the substance is crisp and in such a condition that it can be reduced to a fine powder without any difficulty being experienced from stickiness. The dried material should be ground to a fine powder when the resulting product should be a white or cream coloured powder with a characteristic, but not putrid, smell. The power should be packed in tins or bottles, and carefully preserved from contact with the air. Grinding is easily effected in a mill of the type commonly employed for grinding coffee: when grinding it is desirable to have the papain slightly warmed.

CULTIVATION OF PEPPER IN THE BOMBAY PRESIDENCY.

A further account of Manures used in Spice Gardens.

BY J. MOLLISON, ESQ., M.R.A.C. DEPUTY DIRECTOR OF AGRICULTURE, POONA.

[The Survey Commissioner and Director, Land Records and Agriculture, Bombay, having furnished this office with a copy of Mr. Mollison's report No. 547, dated the 7th October, 1900, (on the above-mentioned subject) the following extract from it is given as a supplement to the *Agricultural Ledger* No. 3 of 1900. The additional information will be found to include enumeration of those trees, the leaves of which are commonly used for leaf manure, as well as the chemical analysis of the different kinds of leaves, manures, and soils by Dr. Leather, Assistant Agricultural Chemist to the Government of India. The information thus furnished may be found of interest as a contribution to the large question of GREEN MANURING.] *Ed.*

The more common trees in *beta* lands and in protected forest, which are specially useful to the cultivators, for manure purposes, are referred to in short detail below:—

Kaval or Kavla (*K.*)* (Careya arborea, *Roxb.*)—Leaves big, fleshy, soon rot as green manure, and considered specially good for leaf mould. Trees abundant in *beta* lands.

Honne (*K.*) (Pterocarpus Marsupium, *Roxb.*)—Leaves are rather small and are not considered particularly good for leaf-mould.

Jambe (*K.*) (Xylia dolabriformis, *Benth.*) Used more as a covering for the leaf-mould manure as light branch wood than for leaf-mould. They do not decay quickly.

Hirda (*M.*), *Alale* (*K.*) (Terminalia Chebula, *Retz.*)—The best leaves of all for green leaf-mould, and are supposed to kill insects and grubs. Leaves small and do not rot very quickly. They are eaten as fodder by cattle.

Kanagal (*K.*) Dillenia pentagyna, *Roxb.*)—Leaves are good for leaf-mould. They are very large and fleshy and decay very quickly. Flowers, buds and fruit eaten. Berries eaten greedily by deer and other animals.

Honal (*K.*) (Terminalia paniculata, *Roth.*)—Considered nearly as good as *matti* for leaf-mould. Leaves not large and do not decay particularly quickly.

Matti (*K.*) (Terminalia tomentosa, *Bedd.*)—Leaves and branches considered excellent for leaf-mould, the former large and easily collected. Leaves used as cattle fodder.

Nerlu (*K.*) *or Jambul* (*M.*) (Eugenia Jambolana, *Linn.*—Used to a considerable extent for a leaf-mould or for branch wood, used as a covering over leaf-manure.

Bite (*K.*) (Dalbergia latifolia, *Roxb.*—Blackwood. Reserved as a valuable timber tree.

Nelli (*K.*) (Phyllanthus Emblica, *Linn.*)—Branches also used as protective covering for young cardamom seedlings. Fruit and leaves good fodder.

Surhonne (*K.*) (Calophyllum tomentosum, *Wight.*)—Sirpoon tree. Evergreen. Found in *Kans*, not in *beta* lands or protected forest.

Kari Muttala (*K.*) (Ougeinia dalbergioides, *Benth.*)—Leaves used for fodder.

2. It will be noticed that the unreserved trees which are reported to give the most useful leaves and branches for garden requirements have no great value as timber trees.

3. A Kanara gardener requires that the leaves for green manure shall be within his reach so he pollards and lops. Afterwards the foliage (it is cut every second year) is within easy reach and for a number of years a large amount of both foliage and light-branchwood is produced. In course of time the tree dies prematurely by exhaustion or ill-health induced by bad usage. The pollarding practised unquestionably shortens the life of trees. It will also diminish their full value when dead, because they have spent their substance in producing by unnatural treatment leaves and small branches instead of natural growth. But the result justifies the means because small branches and leaves are specially required by the gardeners. And if young trees of suitable varieties are so protected that they replace old decayed trees, and if pollarding is prohibited until young trees attain certain dimensions as proposed by the Committee in the draft rules, then I think the interests of Government will be fully safeguarded, and the requirements of the gardens fully maintained. I saw numerous instances of well-managed *beta* lands.

* (K) indicates that the name is Kanarese, (M) that it is Malayalam.

I saw also instances of ruthless destruction with the surface burnt to encourage grass, and no forest undergrowth to speak of, but side by side with these badly managed *beta* lands there was even greater destruction in protected forest for which the people at large, and not the garden owners alone, were responsible.

It is suggested in the papers that the full requirements of the garden occupants could be met if they gathered dead leaves and grass in enclosed forest to supplement the supplies of green leaves and twigs got from assigned *beta*. It is also urged that the dead leaves and grass would not be less valuable for manure than green leaves and twigs. I cannot support these views. Leaves, as they become perfected, dry up and become fibrous and a good deal of the plant food, both mineral and organic which they contained when green and growing, passes from them and is utilized in increasing the size of the stem or branches and in perfecting the fruit. There can be no question at all, therefore, as regards the superiority for manurial purposes of the green leaves of a particular tree over the dead leaves from the same tree. The dead leaves fall, moreover, at a particular season and have to be collected at that particular season; otherwise they soon become incorporated with the soil and disappear. If put in deep pits they would in the course of a year decompose into what is known as a leaf-mould by gardeners. This materal would, in my opinion, have inferior manurial value to the manure now used. I am convinced that such would be the case from the results of analyses by the Agricultural Chemist to the Government of India of the various descriptions of green leaves and small twigs ordinarily used. I sent him the leaves and twigs of eight different varieties of trees, being such as are considered best for leaf-manure. The analyses are appended below:—

	Moisture ...	Dry matter ...	Organic matter ...	Mineral matter ...	Silica ...	Potash (K_2O) ...	Phosphoric acid (P_2O_5) ..	Nitrogen ...
Carya arborea.	80·66	19·34	18·00	1·34	·08	·43	·086	·31
Bassia latifolia.	78·95	21·05	19·60	1·45	·10	·43	·087	·43
Pterocarpus Marsupium.	78·77	21·23	19·58	1·65	·12	·53	·095	·45
Xylia dolabriformis.	73·31	26·69	25·24	1·45	·11	·44	·08	·62
Terminalia Chebula.	77·77	22·23	20·90	1·33	·04	·30	·078	·40
Dillenia pentagya.	87·06	12·94	11·68	1·26	·08	·41	·070	·24
Terminalia paniculata.	75·06	24·94	23·42	1·52	·12	·40	·100	·42
Terminalia tomentosa.	81·86	18·14	16·74	1·40	.07	.44	.080	.34

5. The leaves and twigs contained from 73 per cent to 87 per cent. of water. But even in this succulent condition the percentage of nitrogen and potash (the two most important elements of plant food) were equal to about half the quantities usually found in well preserved farmyard manure. The air-dried material of these leaves and twigs would be considerably richer in nitrogen and potash than air-dried well-preserved cattle manure. The leaves and twigs are all deficient in phosporic acid. The contention of the gardeners that certain leaves are better manurially than others is not supported by the analyses. *Hirda* leaves are considered locally very superior for leaf-manure, also those of *matti* and *honne*. But the analyses show that other varieties are superior to those for manure purposes. On the other hand, it is fair to state that the leaves of *hirda*, *matti* and *honne* are considered specially valuable, because the manure produced from them destroys insects and grubs which would be harmful to the plants in the garden. These leaves and in fact nearly all the leaves used by the gardeners have astringent properties, and it is, I think, certain that vegetable matter containing astringent resins or volatile oil would be obnoxious to insects and therefore insects or grubs which might be harmful to the plants of the garden would not harbour in such material. Dry leaves, unless collected soon after they have fallen, undoubtedly harbour insect life, and this is one serious objection to their use as manure. I was hopeful that the Agricultural Chemist would be able to state definitely how far the various leaves and twigs submitted for analyses differed in astringent properties. He was, however, unable to investigate this point. I took no samples of dead leaves, because at the time of my visit to Kanara (April) it was impossible to collect samples which could be identified as belonging to any of the particular trees from which green leaves are usually taken. In fact dead leaves had mostly disappeared by that time. I believe they mostly fall in December-January, and could not, except in trifling quantity, be collected during the monsoon when green leaves and twigs are ordinarily collected as manure.

6. Dr. Leather's analyses clearly indicate that manure of good quality can be made from the green leaves and twigs ordinarily used. The system of trampling the leaves under the feet of cattle, so that the urine and solid excreta are absorbed would improve the quality of the manure particularly if the cattle are fed partly on cake as is sometimes the case. The storage of manure in deep pits formed in soil and subsoil, which is very retentive, can hardly be improved upon excepting that the extremely heavy rainfall of the district must keep the unprotected pits excessively wet during the monsoon, and probably valuable manurial ingredients are washed out of the manure at this season.

7. The Kanara system is to apply manure every second year.

8. I submitted to the Agricultural Chemist to the Government of India four samples of manures. Each sample is sufficiently described in the tabulated statement below:—

	Monsoon green leaf manure. Sample taken from roots of trees to which it was applied in February 1898.	Green leaf-manure as applied to Betel palms, February 1899. Sample taken in April 1899.	Dry leaf-manure made from dead leaves used as litter under cattle fed on grass, etc.	Manure made from green leaves collected in the rains and used as litter under cattle.
Moisture ...	55·07	58·05	56·90	59·72
Dry matter ...	44·93	41·95	43·10	40·28
Organic matter ...	23·44	28·74	25·42	26·48
Mineral matter ...	21·48	13·21	17·68	13·80
Sand ...	14·69	7·80	11·43	7·47
Potash (K_2O) ..	·16	·41	·43	·17
Phosphoric acid (P_2O_5) ...	·14	·18	·12	·17
Nitrogen ...	·51	·51	·55	·75

It is difficult to nnderstand the deficiency of potash in the 4th sample. The nitrogen and phosphoric acid are probably about average for this kind of manure. Samples No. 1 and 2 were originally of similar class to sample No. 4. They were, I imagine superor in quality orginally to No. 4. No. 1 sample (taken in handfuls from many trees) is by no means exhausted 14 months after application, and it may be inferred from this that the gardeners' methods of application and of proteoting tho manure from surface wash and heavy rainfall by a covering of branoh-wood and leaves are successful in practice. From personal observation, I can say that the branch-wood, a full year after being first put on, is sufficient to break the force of heavy downpours of rain, and when first put on or afterwards allows tho rainfall to percolate through the manuro to feed the plants. It is suggested in the papers by one officer that the gardeners should use the leaf-sheaths of tho *supari* palm (Aroca Catechu, *Linn*,,) leaves as a protection for the manuro instead of the branch-wood now used. The leaf-sheaths are all required for another purpose in the garden economy, and in any case the manure does not as Mr. Davidson points out) need a water-proof. It needs protection and needs also to soak up the rainfall, as it falls in a fair and reasonable way.

9. No, 2 sample was taken in the same way as No. 1 in handfnls from above the roots of many trees. The samples were taken two mouths after application. No. 2 contains less sand than No. 1 for obvious reasons, and probably its original manurial elements had been since application utilized to considerable extent, as the trees and plants were in active growth. The garden soil and the manure were qnite moist, and there had been rather abnormal heavy rainfall some little timo before the samples were taken. These are conditions which would help the plants to utilize the manurial ingredients qnickly. The sample No. 3 from dry leaves used as litter under cattle is qnite as good as might be expected. It has about half the manurial value of good cattle dung manure. The owner considered it was poor stuff. The high percentage of sand is noticoable.

10. There is no doubt that the present system of manuring in the Kanara Gardens is successful in practice, provided the gardeners are allowed to use in sufficient quantity the kinds of forest produce which they prefer. The system of manuring is expensive, even though the materials are got free, and the destrnction caused to forest growth is enormous. Under the circumstances, it would, I think, be most advisable to test by experiment whether available concentrated manures, such as castor cake or safflower cake, conld take tho placo of a portion of the manure now used. These cakes can be imported from Dharwar at reasonable rates into tho district. Castor cake is less valuable manurially than safflower cake, and is dearer. In tho Gardens of Bassein, with heavy rainfall in light soil, castor cake is successfully nsed. It is obnoxious to insect life, and if used in the Kanara gardens there would probably be less damage done by grubs and borers, which certainly do considerable damage to the garden plants and trees now.

11. I append hereto analyses by Dr. Leather of samples of four descriptions of soils which are sufficiently described in the appended tabular statement;—

	Kagadali earth, *e.e.*, the earth excavated from embankments and carried in head-loads to renew the garden soil of old-established garden when renewal is required.	Earth from rice beds near a thriving spice garden and similarly situated to the garden and presumably capable of being converted into garden.	Soil from old-established gardens.	Soil from new extension of an old garden.
Lime (CaO) total	·11	·09	·15	·19
Magnesia (MgO) total	·30	·30	·29	·38
Alkalies total	1·07	·31	..	..
Potash total	·154	·071	·110	·27
Potash (K_2O) available	·003	·008	·004	·005
Phosphoric acid (P_2O_5) total	·086	·04	·073	·074
Phosphoric acid available	·001	·0017	·0005	·0015
Nitrogen total	·014	·20	·09	·18
Nitrio acid (as Nitrates)	·0009	*Nil.*	*Nil.*	·003

12. Dr. Leather says the samples are all deficient in lime phosphoric acid and more or less so in available potash. I should, as a matter of fact, class them as agriculturally poor, but in my extended notes regarding tho garden cultivation I remarked that it does not matter much whether the garden soil is naturally fertile or not, because the yield of the orops is mostly affeoted by the quality and quantity of manure given. As regards the soil it must be of such consistence that it withstands the denuding effect of flood water and be so retentive of moisture that little or no irrigation is required in the fair season. All the samples snbmitted to Dr. Leathor possessed these desirable qualities. It has already been shown that the leaves and twigs used by the cultivators are rich in potash and also in nitrogen, in which the soils are decidedly deficient. It has also been shown that the trampling of the leaves under cattle and the absorption of the excreta particularly, if the cattle are partially fed on cake, improves the resultant manure in phosphates. Dr. Leather has not separately estimated the amount of lime in the manures, but he shows that the soils are dificient in this important ingredient. I have already stated that the *matti* tree when burnt leaves and ash rich in lime, or, according to local opinion, it yields *chunam*. The cultivators are specially anxious to be allowed to take the leaves and twigs of this tree. If the manure applied to the trees in the Kanara gardens was mixed, as in common Agricultural practice, freely with the soil, then the soil in old-established gardens would prohably be richer in manurial ingredients than new soil.

13. I conclude from a stndy of Dr. Leather's analysis that the system of manuring, as practised in the gardens of Kanara, is as right in theory and practice as it well can be, provided tho manure as it accumulates in the pits is subjected in the least possible degree to the wasteful wash of the heavy Kanara rainfall,—*Agricultural Ledger*.

PLANT BREEDING.

We learn from tho March number of the *Journal of the Board of Agriculture* that the United States Department of Agriculture have recently issued a Bulletin, by Professor W. M. Hays, on plant-breeding, whihh contains a good account of the *technique* of the subject, and some stimulating suggestions. "Many look to the production of improved varieties

of cultivated plants as a sure way of increasing the yield and quality, and already results have been achieved sufficiently remarkable to encourage much hope for the future. One of the most striking instances is furnished by the Sugar-Beet, which in Germany, in 1836, contained only five per cent. of sugar, and now furnishes not much less than fifteen per cent. During the same time the gross yield of roots per acre has increased by about fifty per cent., so that the output of sugar per acre is now over four times as great as seventy years ago. a result for which careful breeding is chiefly accountable.

In this and other countries much has been accomplished in the matter of plant improvement, but much undoubtedly remains to be done. It is work that makes no exceptional demands on capital or skill, as is proved by the fact that many of our best varieties of plants, especially vegetables, flowers, and fruits, have been raised by amateurs, in not a few cases by cottagers. It is, however, work that requires much perseverance, and at certain seasons much attention; though the demands that it makes on time necessarily depends upon the extent to which it is carried on. For its successful performance it requires inteligent observation, a knowledge of the gardener's or farmer's requirements, delicate manipulation, and accurate recording, rather than strenuous exertions.

Two main lines are usually pursued to produce a new and improved variety of crop-plant. One method of producer, which has been successfully adopted by some of the best known workers, is to make a careful examination of the individual plants in crops cultivated in the ordinary way, and from these to make a selection of those that are distinguished by superior merits Such superiority may take the form of yield, capacity to tiller, a high percentage of starch as in Barley and Potatoes, or of sugar as in the case of Turnips, Swedes, and Mangolds), capacity to ripen early, to resist disease, &c. But whatever may be the object selected, it must be kept steadily in view, and all individual in the progeny that fall short of the character that may have been set up must be carefully eliminated. By intelligently pursuing such a system of selection during a series of years, a distinct type or variety will be produced.

The other method commonly pursued begins by artificially crossing two individuals whose superior qualities it may be desirable to unite in a single variety. The seeds that result from such a cross are shown, and it is generally found that the resultant plants are extremely mixed in character. Many are inferior to either of the parents, others occupy an intermediate position, while a few may be superior to both. It is the latter only that are reserved for subsequent cultivation, and from their progeny also many individuals must be eliminated. In the course of time, however, the percentage of inferior individuals becomes smaller and smaller, until, at last, the variety comes true to type.

In the main, these two systems of improvement are the same. The plants selected in the first case may be natural crosses, while in the second they are artificial crosses, but the improvement is, in both cases, completed by selection. The larger the number of plants selected or of crosses effected, the greater are the chances of a really valuable new variety being found and for this reason it is desirable to work with large numbers, though, of course, one may be fortunate in producing a valuable variety even when the work is being carried on but on a very small scale.

In sowing pedigree seeds, the soil should as a rule be of good quality, so that the resulting plants may have the opportunity to produce the maximum yield. But it is of even greater importance to arrange matters so that each individual plant is placed in possession of precisely the same conditions of growth. Only in this way can we be sure that the appearance of superior qualities in the progeny is due to something inherent in the plant itself, and not to the specially favourable character of the situation where it has been grown.

Farmers have generally given more attention to the breeding of animals than of plants, but just because less has been done in the latter field, more probably remains to be accomplished. It is surprising how quickly a single plant multiplies, if the conditions be made as favourable as possible. The Late Mr. Shirreff gives an instance from his own experience. In the spring of 1819 he found a specially vigorous wheat plant in a field on his farm in East Lothian, and he resolved to propagate it. He therefore removed the plants in its neighbourhood, and gave it a dressing of manure, the result being that, notwithstanding some damage by hares, he harvested from this single plant 63 ears, containing 2,473 grains. In the following autumn these grains were dibbled in wide rows in a suitable piece of ground, and in the two succeeding seasons the produce was sown broadcast. The result was that the fourth harvest from the original plant yielded 42 quarters of seed, which was subsequently placed on the market under the name of Mungoswells Wheat."—*Gardeners' Chronicle.*

CENTRAL AMERICAN RUBBER.

It is generally considered that Central American rubber is the product of *Castilloa elastica* Cervantes, described and figured in the *West Indian Bulletin*, Vol. II, pp. 101-3. The tree has a variety of local names the most important of which are 'Hule' or 'Ule' and 'Caucho.' Distinct from this plant is *Castilloa Tunu*, Hemsley (*Hooker's Icones Plantarum*, plate 2561), a tree also found in Central America and sometimes confused with the true Central American rubber tree which it closely resembles in general appearance. In an article which appeared in the *Beihefte zum Tropenpflanzer* for July 1901, Mr. Th. F. Koschny, a planter of long experience in Costa Rica, distinguishes the following varieties of 'Hule' trees:

Castilloa elastica;
- 'Hule blanco' ... ... White rubber tree.
- 'Hule negro' .. ... Black rubber tree.
- 'Hule colorado'... ... Red rubber tree.

Castilloa Tunu:
- 'Hule tunu' ... .. 'Gutta percha.'

The names of the three so-called varieties are given from the colour of the bark of the tree. 'Hule Blanco' is described as the only one worth cultivation, giving thick and abundant latex. The tree is not shade loving, being seldom found in forests, and not easily injured by tapping. 'Hule negro' gives a watery latex, and that of 'Hule colorado' whilst good, is scanty.

Mr. Koschny suggests that 'Hule colorado' may have been introduced into Java and Ceylon, and be the reason for the comparatively small returne given by Central American rubber trees in those islands. This point was touched upon by Dr. Morris in his Cantor Lectures on the 'Plants yielding Commercial India Rubber' to the Society of Arts in 1898, 'The plants distributed from Kew and now under cultivation in various tropical Colonies would be more correctly termed, according to their place of origin, Darien "Castilloa" or Darien "Caucho" trees. This would distinguish them from the Ule trees of Mexico, British Honduras, and Nicaragua, and indicate their history. It is Possible that there is no great difference, if any, in the quality of the rubber yielded by these trees, but so far no one has undertaken a comparative investigation of the produce.'

The Ceylon plant has been considered as possibly belonging to the species *Castilloa Markhamiana*, Markham, (Circular No 11, Botanic Gardens Ceylon). On the other hand in the *Kew Bulletin*, for Sept, 1901, Mr. W. B. Hemsley states that *Castilloa Markhamiana* is not distinguishable from *Castilloa elastica*

Careful comparison at Kew between typical specimens of the rubber tree from British Hondura,

Mexico, and Darien, so far, has failed to reveal any differences sufficient to warrant the recognition of definite varieties. Mr. Koschny's varieties have not yet been established botanically. Specimens have been sent by him to Prof. Warburg of Berlin, an authority on this group of plants, and their determination will be awaited with interest.

It is important meanwhile to draw attention to the fact that probably more than one variety may be cultivated under the name of 'Central American rubber tree,' and intending growers should be careful to secure seeds or plants from reliable sources.—*West Indian Bulletin.*

THE PRINCIPAL VEGETABLE PRODUCTS OF THE HAWAIIAN ISLANDS.

As everyone in the horticultural world knows, Sugar is the staple industry, and is largely cultivated throughout the Islands. It was cultivated in very small quantities before 1876, when a treaty of commercial reciprocity with the United States came into effect. Under the provisions of this treaty an era of unexpected prosperity set in, and the production of Sugar, as well as Rice, increased more than was ever anticipated. Large barren tracts of land were brought into cultivation by extensive irrigation, some of the ditches being 40 miles in length, carried through dense woods, tunnelled through rock, and spanning wide canons. The Ewa Plantation, near Honolulu, is one of the largest and finest in the Islands. About 90,000 acres are taken up with the various plantations, with a yearly yield of about 225,000 tons of sugar. It requires an average of eighteen months for a crop to mature, the ordinary yield being 3½ tons to the acre; yet on specially rich alluvial soil, it is sometimes as great as 9 tons to the acre

Next in importance comes Rice. Its culture is principally carried on by the Chinese, and in the San Francisco market it grades with the best coming from China. The ground is ploughed and well harrowed, the field is then submerged, the water being allowed to stand until the crop ripens, when it is drawn off. The method of cultivating is crude and primitive. The Chinaman sows the seed thickly in a small field; when the plants are about 6 inches high, they are pulled up and taken to the field for planting, where they are set out in the mud by hand in rows about 8 inches apart. When matured the water is drawn off to allow the straw to ripen. The crop is then cut with the sickle. No threshing machines are used by the Chinese Rice grower, but the grain is separated from the chaff by being beaten out with the hoofs of horses or Chinese cattle, as in ancient times.

Coffee is cultivated, but not to a large extent, although Hawaiian, or Kora, Coffee takes a high place among the best Coffees of the world; the trees are grown anywhere, from the sea-level up to 3,800 feet above the sea. One of the greatest difficulties to contend with is insect blight, which is greatly kept in check by peculiar parasites, and ladybirds that have been introduced for each kind of insect. The cultivation of Tea is carried on with good results, the best quality of leaf being obtained on the higher elevations. The high price of labour prevents its more extensive cultivation.

Hemp has been experimented with, and pronounced by experts to be of a good, strong description. The expense of cultivation is trifling, and the yield per acre is about 13½ tons. Ramie, or vegetable silk, grows luxuriantly, but the industry is not developed, owing to the want of suitable machinery.

The soil and climate of Hawaii cannot be excelled for the production of tropical and sub-tropical fruits, and their introduction has added largely to the prosperity of the islands, especially so in the case of semi-tropical fruits, such as the Alligator-pear Banana, Lime (Citrus Limetta), Orange, and Lemon. The Alligator-pear grows to a large size, and the fruit is of a superior quality. The flesh is of butter consistency, with a nutty flavour, and it makes a delicious dressing for salads; the largest of these heads is about 6 inches long, and weighs upwards of 3 lb. The Mango grows in great profusion, and several varieties are used for making chutney, the best varieties having been imported from India and Jamaica. It is an evergreen with small, glossy leaves; and a gum which exudes from the trunk of the tree is used in medicine. It bears fruit several months of the year, and it is not unusual to find trees with fruits on one side and blossoms on the other.

Coconuts grow all along the sea-shore, or any spot where nothing else will grow; but they are now very little cultivated. The Sapodilla, Soursop, Pommelo, Cherimoya, Custard-Apple, Papaw, Citron, Water-Melon, Granadilla, Pomegranate, and Tamarind are some of the desirable exotic fruits that do well in the islands. Vegetables of all descriptions are raised throughout the year, and Water and Cantaloupe Melons are superior to those grown in most countries. Pineapples grow wild on all the islands; there are some twenty-five varieties taking their names from the localities whence they are obtained. Near Pearl City, some eight miles from Honolulu, a plantation of an excellent variety exists. The average weight of the fruits is 8 lb., although the fruits of some varieties have been known to reach a weight of 17 lb. The Pineapple season is from the middle of the month of May to the middle of August.

Bananas are raised in great quantities and shipped to the west coast of the United States, the cost of cultivation being very small. Along the mountain ranges are trees and Vines in luxuriant growth, forests of a magnificent species of tree, whose wood has beautiful markings, and capable of taking a high polish, equalling the finest walnut and mahogany; this is the Koa-tree. The islands at one time were very rich in Sandal-wood, but when the natives found it would be a great source of income to them, they cut down the old trees in a very short space of time, and sold them to dealers in the United States, and neglected to plant young trees for a future supply.

Not the least important vegetable product is Taro. It consists of two kinds—the upland, which grows on the hillsides in dry ground, and the lowland, or more important staple, which is propagated like Rice, under water. Long irrigating ditches are required in preparing the bed. The ground is levelled off and enclosed by a wall impervious to water. The floor of the patch is made as rich as possible, and the top is cut from the ripe roots and set out in hillocks placed several feet apart. The water is let in, and allowed to remain until the crop is mature, i.e., in about twelve months, the only labour required being to keep the soil clear of weeds, and provide a depth of about 6 ins. of running water. Taro can be planted at any season, and a ripe crop obtained. The root is oblong, the largest being about 1 foot in length, and from 3 to 4 inches in diameter. The root is baked by the natives, who make from it what they call *poi,* the baked root being pounded till it forms a paste, which is thinned by adding water, and afterwards allowed to ferment. As a food it is most nutritious.

Another important plant much used by the natives is the Ti; it has also a large, oblong root, and the leaves are of a shining green tint. The Ti-leaves were at one time woven together, and formed a short cloak, which the natives sometimes wore. The root, after baking, is sweet and pleasant to the taste. It is also used to make an intoxicating drink, by bruising the roots with a stone, and steeping in water until it ferments.

Besides the plants mentioned, there are many beautiful flowering and foliage plants, among which Codiaeums (Crotons) are worthy of special mention. All the varieties grow in great luxuriance, and show exceedingly rich leaf-colouring. Round the College grounds, in the suburbs of Honolulu is a hedge of a night-blooming Cereus (Cereus nycticalus), which is a magnificent sight when in flower, the blossoms ranging from 2 to 3 feet in circumference, *Donald McIntyre Moanalua, Honolulu.—Gardeners' Chronicle.*

POINTS FOR PRACTICAL PATRIOTS [IN JAMAICA: HOW MANY APPLY TO CEYLON?]

If yon want to help on the finances of the island in a practical manner, adopt the following hints; and if everybody did so a few years would see the circulation of perhaps double the amount of cash among the people, for there would be a half less sent out of the country for things we can and do produce easily ourselves.

Use conntry corn, when available, even if it is a 6d. a bushel dearer than imported corn; it would soon get cheaper.

Use Jamaica "red peas" and black-eye peas even though they are 6d. a quart, and the American can be got at 4½d.; our own are fresher and sweeter.

Use Coconut Oil in all cases where you use Cotton Seed or any other salad oils at present.

Use Cassava Starch and stop buying imported corn or potato starch.

When you go to buy Arrowroot, be snre to ask if it is Jamaica-grown,—you will soon get the home prodnct if you want it.

Make your own Preserves and use less sugar, as they usually are too cloying: or bny the Jamaica Preserves when yon can. If they are often asked for tbey will get cheaper.

Use Jamaica-made Soaps which are again available; the factories employ local labour, pay taxes, and buy coconuts and other local products to make the soap of.

Patronise the local dairy when you want milk—it is better than condensed milk and the more that is asked for the cheaper it will ultimately be got for,—quick returns encourage small profits.

Fresh pork and beef are in all ways better than the barrelled salt-junk which may be horse or dog for all you know.

Use more honey, it is the most healthful of all sweet stuffs, and can be employed in the household in a score of ways more than at present.

50 ACRES OF LAND AT 1s. PER ANNUM.

IN THE NEW HEBRIDES.

The 100,000 acres at the New Hebrides which Messrs. Burns, Philp, and Co. have placed at the disposal of the Commonwealth Government for the purpose of encouraging British settlement is to be leased to intending settlers at 1s. per annum for each 50 acres or part thereof, with a provision for sale to the occupants under conditions prescribed by the Commonwealth Department of External Affairs. Between 50 and 60 men, representing with their families between 200 and 300 souls, are expected to go down by the "Mambare" from Sydney on June 1.—*—Sydney Mail*, April 12.

COLOMBIAN CASSAVA.

A FAMINE PLANT.

Under the above heading we several months ago offered some observations on an interesting series of letters that had passed between the India Office and Mr Robert Thomson on a subject of great importance to Jamaica and her sister West India colonies. The primary object of the correspondence, however, on the part of Mr Thomson, was to suggest to the Government of India the introduction into that country of some of the more important varieties of cassava under cnltivation in Colombia and other Sonth American conntries with a view to mitigating the calamitous effeots of the ever-recnrring famines that inflict such severe suffering and distress on extensive provinces of our Indian

Empire. One of the distinguishing and—so far as their introduction into India is concerned—most valuable properties of the Colombian varieties of cassava is what may be termed their constitutional flexibility—their independence of climatic and other vicissitudes. Rice, the principal article of food in India, requires for its cultivation a rainfall of at least 56 inches, and an Indian province requires an average fall of at least 50 or 60 inches to grow rice as a staple crop.

We are glad to know that Mr Thomson's correspondence has borne fruit and that the Director of Land Records and Agriculture, Bombay, has decided to commence the cultivation of Colombian cassava on the Government farms. Mr Thomson has just received a letter from the Director acknowledging, with many thanks, the receipt of a case containing some twenty-three varieties of cassava from Colombia, and mentioning that the stems or cuttings had arrived in good condition. This information furnishes pleasing verification of what we said months ago to the effect that the stems, if carefully handled, would retain their remarkable vitality for several months after being cnt. The cuttings, we may mention, were brought from Columbia—having been obtained from sections of the country a thonsand miles apart—by Mr Thomson's son—Mr Kay Thomson—who in consequence of the insurrection then in progress took several weeks to reach the coast from the mountainous interior. Notwithstanding this delay and the time taken in conveying the cuttings from Jamaica to Bombay, the Colombian varieties reached their destination in good condition and the Director of Land Records and Agriculture promises to let Mr Thompson know the result of their propagation in due course.

Our readers will be pleased to learn that the nursery, formed in August last with the cnttings hrought from Colombia by his son, has proved a signal success, and that thousands upon thousands of cuttings are now available. In addition to the several acres of the ordinary varieties of cassava which have been planted at May Field on the Hope Road in the neighbourhood of King's House, Mr Thomson purposes planting the new varieties on an experimental scale with a view to determine the relative merit of the several varieties. From Mr Thomson's interesting report on his visit to Florida we gather that Cassava cultivation promises to be the staple industry of that enterprising peninsula. It is a noteworthy circumstance that Florida is indebted to Jamaica for this important indnstry. Abont three years ago an American tourist in Jamaica, Mr Perkins, was struck with the value of cassava as a starch-yielding plant. On his return to Florida he organised a company and erected a great factory which Mr Thomson visited at the end of June. We learn from his report that a thonsand acres of cassava are planted in the vicinity, hundreds of acres being cultivated by gentlemen connected with the factory. Within sixty miles of the factory the managers purchase the tubers delivered at railway stations at five dollars per ton, and the cnlture is extending rapidly. Not only is cassava the cheapest known source of starch, but it is said to be the cheapest and best ration for feeding and fattening farm stock. From the report of the Professor at the Florida Agricultural Experiment Station, Mr Thomson makes the following extract:—

"With all the facts procnrable, and with the experience not only of myself, but many practical farmers to support the opinion, I have reached the conclusion that, all things considered, cassava comes nearer fnrnishing the Florida farmer with a more universally profitable crop than any other which he can grow on eqnally large areas. It can be ntilized in more ways, can be sold in more different forms, can be more cheaply converted into staple and finished prodncts and can be prodnced for a smaller part of its selling price, than any other crop."

In a future issue we shall show how practicable as well as desirable it is to establish a great cassava in-

dustry in Jamaica. Some of the Colombian varieties are doubtless well adapted to the soil and climate of Jamaica, and the establishment of a new industry is a matter of no small importance to Jamaica and the sister West India colonies. But, as we remarked on a former occasion, the introduction into India of a new, adaptable article of food is of vital importance to the inhabitants of the Eastern Indies, inasmuch as it marks the initiation of an enterprise which will, we trust, be pregnant with benefit and blessings to millions of our fellow-subjects in the East Indies.—*Jamaica Daily Telegraph.*

EXPERIMENTING IN GREEN TEA MANUFACTURE.

[BY AN OLD PLANTER.]

The great reduction in the cost of equipment and construction of cold storage chambers that has recently taken place, and the certainty of still further cheapening down, should enable those planters who have a desire for manufacturing teas resembling the Japan greens to turn them out with some chance of succeeding in the competition, though it must be remembered that Japans are roasted by direct heat, not baked as ours are, and though we have been found fault with for recommending a return to something approaching the old-fashioned firing, in vogue before introduction of the sirocco, we still hold to the idea that our engineers could, if they devoted attention to the subject, devise an apparatus for roasting, in which economy in fuel with retention of the aromatic properties in the leaf could be combined. On many estates this promises to be a season of experiments, but we earnestly trust that these will be limited to dealing with small quantities, as, though we have been assured that unfermented tea (as it is called) is stated to have been successfully manufactured in both hill and low country in Ceylon—an assertion, however, since rather discounted by Mr Galt—it would be most unwise to plump for a thoroughly radical change in dealing with the whole crop, there being four instances of the disastrous effects of so doing between 1862, the era of the sand tables, and 1880, when the sirocco first commenced to replace the *pucca dholes.* We entered fully into the effects of keeping rolled leaf in a state of suspended animation (if that term is permissible) a year ago, pointing out that the cooling down of rolled leaf permitted the evaporation of tannin, while, though teas so treated were lacking in strength to a very infinitesimal degree, the flavor was improved, and now that the object is to force Indian tea into consumption on its own merits alone, the "retention" of tannin, hitherto needed for salting weak China, is no longer requisite. Reliable information published last year from our Consuls in Russia showed that large as the importations of Indian and Ceylon teas were, they were quite unfitted alone for the *Samovar*, and though we know nothing definite as to the importation overland of Chinas into Russia we may infer that our teas are merely used for blending with the weaker Congous through the large and increasing quantities taken would lead to the idea that our weaker teas were gradually coming into vogue for the stewing process, unmixed. Haggenback, who has so recently made the great haul of Ukraine horses in S.E. Russia, states that, in one of the inns the first water poured on the tea in the *samovar* after stewing for an hour, was drawn off, decanted into jars and set aside to fortify the second brew as it weakened. Such a proceeding, from what other travellers tell us, would produce a liquor suited to the Russian taste, and account for the growing demand, but our opinion is that this demand would greatly expand did we supply a tea that could be used without resort to the practice, and such a one can be turned out by cooling down and slow firing. Both operations, moreover, would give whiter tips which Continental dealers desire; in fact, we should, aim at turning out a more delicate liquoring leaf, though at the expense of strength. That such will entail considerable alteration in the present methods of manufacture must be admitted, but in this, as in all other cases, the public are dictators, and obey them we must. Toning down the raspiness of our teas should occupy first attention, which, as we have shown, can easily be accomplished by evaporating the surplus tannin in the cooling chambers. Adoption of the "basket" firing, as practised in Japan and China, presents, we admit, some difficulty in the way of lighting upon some fuel as inodorous as charcoal; but, as we have now a qualified chemist at command, there ought not to be much difficulty in that, and until he has settled the point, one must adhere to the Sirocco for drying off: surely our engineers can hit upon a furnace that would radiate heat, at the same time securing the leaf from contamination by the fumes. The cooling chamber, according to our experiments, should be kept at a temperature of 40° as, if allowed to go below this, the tannin, volatile as it is, would cease to evaporate, while above 40° there would be the risk of fermentation setting in. The method of obtaining the gray color and white tips is by alternately cooling and heating. That the manufacture of what the American market demands will entail the outlay of money goes without saying, and although the Canadian and Northern States dealers pass eulogiums on Ceylon "greens," it seems to us that the price they are willing to give hardly justifies the entertainment of their recommendations. [?] Should we succeed in ousting Japan and China, securing the 70 million pounds, the uphill fight to do so will be a long and costly one, hardly justifying our entering on it at even the top price for the best greens, *viz.*, 42 cents per lb. While urging the manufacture of green or gray tea, on the experimental scale, we must not ignore that we are still really overproducing, and that our 30 million pounds of reduction of output has dwindled to something less than a third of that; whether from disloyalty or miscalculation, it is needless to enquire. We still earnestly advise further restriction in output, for though the latest news from the districts is a doleful record of ripped flushes from hail, these early violent north-westers are invariably followed by favorable meteorological conditions, and if abstinence is not observed, we may again be tempted to glut the markets, just as we were hounded on to do by the London riggers in 1900. We can always increase our outturn in normal seasons after the rains have set in, and as the stocks in London warehouses are some 15 millions in excess of last year, and in Melbourne half a million with an unknown quantity locked up on the Continent, it would be as well if some arrangements could be come to by which output could be restricted to 140 millions at the outside. Unfortunately we

notice that a large number of concerns have estimated for an increase over last year's production, which, if attained, cannot but lead to lower prices, while what Ceylon contemplates doing we have not the least reliable information about.—*Indian Planters' Gazette*, May 3.

THE CULTIVATION OF COCOA IN AFRICA.

At present the little Portuguese Island of St. Thomé is the great source of production of African Cocoa, but from maps of the Island showing the area under cultivation, as well as from reports, the area suitable for cultivation is pretty well taken up, and anyone wishing to buy an estate cannot but be struck at the very high prices asked; but in Fernando Po to the North of St. Thomé and the little Ile du Prince between the two, Cocoa is receiving great attention, and shows signs of becoming an important industry, the climate being suitable, and though at present, owing to the absence of means of transit in the centre, the cultivations are mostly along the coast, it is hoped, especially in Fernando Po, that the interior will soon be opened up, and offer facilities for the carriage of produce down to the coast.

Taking the Islands off the East Coast next, the Seychelles islands are slowly but surely pushing ahead, though the quantity they supply is never likely to be very important; in the French Island of "La Réunion" the cultivation has gone back, for whilst in 1884 the total crop amounted to 4,000 kilos, in 1889-1900 it was evidently too small to attract the attention of statisticians, and local chocolate makers complained that they were unable to obtain sufficient Raw Cocoa to satisfy their trade. As Cocoa was well-known in the Island in 1827 it cannot be that the climate is unsuitable.

Cocoa from time to time is also received from Mauritius, but up to now it seems that the cultivation of sugar has engrossed the attention of cultivators, and so Cocoa has had to take a seat in the rear.

It is Madagascar that may in the future become a very large source of supply, (and together with the German Cameroons deserves careful attention) and if it had not been for the (Madagascar) War there is little doubt that it would have been a much more important centre than it is at present. Originally the seeds came from La Réunion, and in 1883 it was calculated that about 6,000 trees were planted, all near the coast, and then came the war so that 1888 (five years later) still found them with only 15,000 trees; but since then I have heard that more than 20 estates have been planted. The climate of this island, however, shows some signs of confining the area suitable for cultivation, the rainfall being too uncertain in the North and South, and too small on the Western side (the one nearest to the Continent of Africa), so that it seems as though the East Coast and the centre are alone suitable for Cocoa; but then the Island is very large, so there should be plenty of room in the centre. The district round Tamatave seems to be the best district, all the year round.

To go now to the mainland, Cocoa is being planted in French Guinea, the Gold Coast, the Ivory Coast and round Calabar but it is badly prepared and at present, I believe, is in the hands of natives who sell it to Europeans to properly dry, if not to cure as well. Reports agree that all these places are suitable for the growing of Cocoa, and considering the absence of skill, attention, &c., the results up to now have been satisfactory.

In the *Belgian Congo* where Cocoa was not introduced until 1884 and not really planted until 1887-88, it was estimated by Mons. Wauters that in 1898 there were 125,000 trees in cultivation. The natives seem to be also growing it under the direction of their chiefs. In the *French Congo*, although it was not started until 1887, Cocoa seems to have made more progress than in the Belgian centre, and is reported to be now in general cultivation throughout the Colony, and has given on the whole satisfactory results. The total shipments from the Colony in 1898 are put down to be 3,800 bags, of which about one-third went to France, and the balance, the estate belonging to a Dutch firm, to Holland.

Now we come to the German Colony of the Cameroons whose cocoa, I believe, is shipped entirely to Hamburg; if so the following receipts of this growth in Hamburg will give some idea of the extent to which the industry has grown since 1892:—

In 1892 the Cameroon returns say the Colony shipped ... 900 bags
In 1895 the Cameroon returns say the Colony shipped ... 2 640 „

In 1897	1898	1899	1900
5,400	6,745	9,047	9,833

—bags were received in Hamburg from the Colony. And to the end of February, the figures compared as follows:—

1898	1899	1900	1901
2,046	1,842	2,053	4,041

bags received in Hamburg from the Colony, showing a regular and substantial increase.

After St. Thomé therefore the Cameroons are expected to be the most important supplier although the very optimistic idea as to returns, when the district was first planted between 1886 and 1890, were rudely disappointed. Before 1886 only a few trees were in existence, and those had been planted by the natives. The cocoa has come from a good stock originally, the seeds having been brought at great cost from Trinidad, Venezuela, Ceylon and St. Thomé. At present most of the plantations are near the coast, or along the river banks in the Western and South Western districts, and there is an abundance of land equally suitable for cultivation, once the trouble of transit has been overcome.

The Germans, it seems, pay great attention to the outward appearance of the bean, and the "break" has been sacrificed for the appearance outside; excessive fermentation, which all African cocoa seems to require, rather spoils the shell, as well as the rounded appearance, but owing to the complaints

from German cocoa manufacturers, it is hoped, buyers will attend more to the "break" than the appearance, and by paying a higher price for a good breaking sample wean the planters from spoiling the inside for the outside. At one time it was maintained that it was impossible to rid the St. Thomé bean of its bitterness, but the experts I sent samples to in the West Indies all said that, given about twice as much sweating, the cocoa would come all right, and certainly of late we have had some piles showing a marked improvement in the break.

H. HAMEL SMITH.

CEYLON TEA IN RUSSIA

AND WHAT A REDUCTION IN THE DUTY WOULD MEAN.

With reference to the tea deputation in London to Prince Stcherbatchoff, presenting the importance of bringing about a reduction in the Russian tea duty, which received some prominence in our issue of last evening, we thought the opinions of local Russian firms on the subject would be of exceptional interest. We have, therefore, made enquiries, with the following results :—One firm which does not desire its name mentioned, says :—

"We have read the articles in your paper on Ceylon and Indian tea, and tea duties in Russia. Our opinion is that, should the duty be reduced, the consumption of tea in Russia would be very largely increased. Cheapest kinds of tea are sold in European Russia at about the equivalent of R1·70 per Russian lb. (36 English pounds-40 Russian), and a substantial reduction in the duty would mean that these kinds of tea would find their way even to the poorest classes in Russia, who cannot now afford to indulge in the luxury of tea-drinking, and the present consumers of tea would probably buy more tea at the cheaper prices, or would take the same quantity as before but of a better class of tea.

"As regards the paragraph about a deputation to Prince Stcherbatchoff, we do not think it will have much influence on our Government, as they must have their own important reasons for not having reduced the duty on tea before this."

Mr. W. P. Ampenoff today favours us with the following statement:—"I am inclined to think that a reduction of Duty in Tea will probably lead to a increased consumption of Tea in Russia, but I doubt the Duty will be reduced by the Russian Government as it is not quite evident whether the increase of import will be in proportion to the loss to Government in Duty, if reduced.'

TROPICAL PRODUCTS IN THE FEDERATED MALAY STATES.

From the report by Mr. A. Berrington, Commissioner of Lands and Mines, F.M.S., on the lands, mines and surveys of the Federated Malay States for the year 1901, which has just been issued as a supplement to the Negri Sembilan Government *Gazette*, we quote the following review of their agriculture for the year:—

The reports of the Collectors only refer to the progress of agriculture incidentally, in connection with the alienation of new land, and no doubt it is more a matter for Administration reports than for Land Office reports. Still, I may notice a few matters of interest in this connection.

PADI.—In Krian, where the cultivation of sugar and padi has been long established on a considerable scale, there has been a disastrous failure of the padi crop, though happily it does not seem to have affected the rent collections. Owing, as the Collector says, to the supineness of the penghulus, in neglecting to see that the transplanting was done at the proper time, the first nurseries were almost entirely ruined, and by the time that second nurseries were ready, and their contents transplanted, heavy rains came to retard the development of the young plants, which were then attacked by a wire worm and the greater part of the crop was spoilt. As a result, the export of padi from Krian, which in 1900 was valued at $538,404, was in 1901 worth no more than $190,533. In several other districts, however, the padi crop has been a fine one. In Kuala Kangsar, where it has been particularly good, I have heard the result attributed mainly to the influence of the penghulus, who understood what ought to be done, and took care that it was carried out.

SUGAR.—Sugar cultivation in Krian produced an export of the value of $1,480,168, as against $1,315,974 in 1900. At the large estate at Sungei Gedong in the Matang district, where over 1,100 persons are employed, the crop is estimated to produce 55,300 pikuls of sugar.

PINANGS.—From Selama it is reported that 10,630 pikuls of pinangs were exported in the course of the year.

COCONUTS.—In Lower Perak, Kuala Selangor and Kuala Langat there has been a considerable demand for land for coconut plantations, but there are also many complaints of the damage done by beetles and by rats. Mr. Hale, the Collector and Registrar of Titles in Kuala Lumpur, thinks that unless rigorous measures are taken it will soon be hopeless to attempt to grow coconuts within five miles of the centre of Kuala Lumpur, owing to the number of heaps of stable and other refuse in which the beetle (Oryctes rhinoceros) is allowed to breed undisturbed.

TAPIOCA.—In Negri Sembilan, where tapioca has been largely grown for years, a considerable area of fresh land was alienated during 1901 for that cultivation, with a condition requiring the planter to introduce some "permanent" form of cultivation (*e.g.*, getah rambong or coconuts) *pari passu* with the planting of the tapioca.

GAMBIER AND PEPPER.—The price of both gambier and pepper has risen, and some fresh land has been alienated for their cultivation.

COFFEE AND RUBBER.—The prospects of coffee have, unhappily, not improved materially, and a great deal of land planted with that product has been abandoned. Many estates, however, have been kept going, and may be expected to do well in the future with the help of the para rubber which is now growing up between the rows of coffee.

TOBACCO.—In Ulu Langat tobacco is grown on small scale by Javanese settlers.

CEYLON TEA ON THE CONTINENT OF EUROPE.

In our opinion, no fuller nor more satisfactory Report has as yet been published from a Ceylon Tea Agent—or Planters' Commissioner—than that supplied for 1901, regarding the Continent of Europe, by Mr. J. H. Renton, and which we publish on page 25. It discloses a wonderful amount and variety of work, and, considering the small sum allotted to the Commissioner, we think he has done wonders. He certainly has not spared himself, nor adopted any one rough and ready course of getting rid of the Ceylon grant with a minimum of trouble to himself; but in encouraging "demonstrations" and a variety of modes of advertising, and of making known the virtues of Ceylon tea, Mr. Renton has been very wise and active in his campaign. In respect of Russia, the Report was framed before the disappointment respecting the St. Petersburg Exhibition was known, and it is very curious to see the suggestion that, as the regular course of trade should not be interfered with, a bonus should be offered (from the Cess money, we suppose) to all importers (or exporters) of Ceylon tea. We do not know if this will be approved of by Russian tea merchants, even if the "Thirty Committee" had the money available to make a grant or bonus worthy of acceptance. But it will certainly be a striking fact in the history of our tea trade development if the export of our staple to Russia should run up, year by year, within a comparatively brief period, to 32 million lbs. without any further call on the Cess Fund.

IN THE WORLD'S IVORY MART.

Billiards are impossible without billiard balls and billiard balls, we may inform him, are equally impossible without the ivory sales. Ivory is one of those commodities that are most intimately bound up with the "romance of trade." There lies the ivory on the merchant's counter, but who shall say how it was originally acquired—what dark dealings went on in the swamps and silences of Africa before it found its way to the trader's possession? About two years ago saw the most curious as well as abundant shipment of ivory from Africa that has been known for many years. It was the time of the Benin expedition, and the natives ransacked the country for ivory with which to seize this unique opportunity of trading. Even the heathen temples yielded up their treasures, for some of the ivory shipped was in the form of idols, And on several of the tusks there was the mark of human blood. The shipments reach the London docks at all times of the year but they are stored up carefully until the time of the sales, which occur four times yearly. Then they are sorted out and arranged in lots on the floor of one of the extensive warehouses attached to the docks. The actual sales occur

AT THE COMMERCIAL SALE ROOMS IN MINCING-LANE,

but for several previous days the ivory is on view to the trade; the scene during these inspection days is not unlike an Academy private view Dotted about the warehouses stand the representatives of various firms, notebook and catalogue in hand, marking off the most attractive lots and discussing the merits of the display.—This week's sales are considered small as ivory sales go: but, nevertheless, the sale value of the stock is roughly estimated at £40,000. The best ivory is what is known as the "soft teeth," which comes chiefly from East Africa, and particularly from Zanzibar, the West Coast supplying the bulk of the other kind—the "hard teeth." Good Zanzibar ivory is very valuable, and in proof thereof it may be mentioned that the record price recently fetched by a tusk of this ivory was £350. The specimen thus purchased was acquired by the British Museum.

MAMMOTH IVORY.

Very little is imported nowadays from India and Ceylon; but a fair supply comes from Siberia. The latter kind is thousands of years old, being the tusks of the ancient mammoths dug up out of the ice. Their size is often tremendous. Our illustration represents two mammoth tusks on view this year, worth probably about £150; they are the finest ever seen at the dock. Mammoth ivory is of inferior quality, however, deteriorating sometimes to £2 per hundred-weight.

160-LB TOOTH.

The best ivory—that from which billiard balls are made—is priced at about £89 per hundredweight. "Bangle ivory" is also quite a recognised trade term, for the teeth used to make the bangles worn by Indian high-caste women. The average weight of the "teeth" is 80 lb, but of course specimens vary tremendously. An enormous "tooth," weighing no less than 160 lb, has been on view at the dock. A curious thing in this connection is the evidence of disease—corresponding almost with our own toothache—sometimes discovered in the tusks, which are frequently hollowed out far beyond the average extent by these ravages. When we consider what agonies of pain a small human tooth is capable of inflicting, we ought not to grudge the ready tear for the elephant afflicted with several yards of toothache. The cure for neuralgia must be in great request in the elephant world. And it would probably not soothe the sufferer to know that his diseased tusk is worth some £16 per hundredweight less than that of the animal whose molars are in good condition.—*Morning Leader*, April 21.

RUBBER FOREST IN THE SOUDAN.

Lord Cromer, in a recent report to the Foreign Office, states that considerable quantities of rubber trees are reported in many of the districts of the province of Bahr-el-Ghazal. Mr. Broun, the Director of Woods and Forests, has been despatched to report on the possibilities of re-opening the india-rubber trade of the Bahr-el-Ghazal, which in former days was one of the principal sources of revenue in that district. It is also hoped, in the near future, to develop the rubber forests in South-western Kordofan, which, from all accounts, are of great importance.—*Globe*, April 25,

MORE ABOUT PEARLS AND PEARL OYSTERS.

THE MANUFACTURE OF PEARLS.

(From "SCIENCE JOTTINGS.") BY DR. ANDREW WILSON *in* THE "ILLUSTRATED LONDON NEWS, April 19.)

Among the curiosities of natural history science may be regarded the manufacture of pearls. In contradistinction to the case of the diamond, pearls appear before us as the work of living animals. The diamond is the product of cosmical heat, and possibly

dates from the days when the earth was young, and when its carbon became crystallised under the action of fervent heat. For, as most of my readers may know, the diamond simply represents crystalline carbon. It has near relations, chemically speaking, in blacklead and charcoal. Chemical science, recognising this fact, has attempted to produce diamonds from a carbon basis. In this imitation of nature I believe they have proved successful; only the diamonds, built up as it were from their carbon parentage, are so small that, commercially speaking, they are of no account. Till chemistry can imitate on a bigger scale than is possible today the work of the inner fires of the globe, it is hardly possible to conceive of the diamond being successfully imitated by the laboratory product.

The ruby and the sapphire also represent mineral products which possess a geological significance. But it is entirely different in the case of the pearl. There we have to deal with the manufacture of an animal form, which of course belongs to the molluscan or shellfish type of life. If we examine an oyster-shell we find it to be lined with a beautifully delicate layer known as nacre or mother-of-pearl. In the well-known "ear-shells" this layer assumes great thickness and by refracting the light from its ridges gives us a typical play of colour and of iridescent hues. Every mollusc in fact shows mother-of-pearl as the lining layer of the shell, although as may well be understood there are infinite variations in respect of the quality, delicacy, and therefore commercial value of this substance. In many shells it is coarse, as to others it is of fine texture and special colour. It is in the latter case that it gives origin to the pearls of great price.

The typical pearl-producing mollusc is, of course, the pearl oyster concerning the welfare of which an English Commission is at present busily inquiring in Ceylon. The Scottish pearl mussel was also celebrated in its day. I use the past tense here because the goose that laid the golden eggs was daily killed in this case as in so many others through the mussels being fished to extinction in the rivers of the North. These shellfish, as the typical pearl-producers, present us therefore with an illustration of the animal manufacture of a precious product. Certain interesting circumstances connected with pearl-production have of late been ventilated by Dr H L Jameson in the course of a paper read by him before the Zoological Society of London. What Dr Jameson has to tell us of the manner in which pearls are produced in a certain species of mussel serves to throw light on the possible manner in which they are manufactured by other shellfish.

Each oyster or other shellfish is enclosed in a kind of skin to which naturalists give the name of the "mantle." It is this membrane which at once envelops and encloses the body of the animal and of course lines the shell. The mantle is the source of the mother-of-pearl which is deposited by it in the shell and naturally it is to the mantle that we also look for formation of pearls. Long ago it was known that each pearl was formed round some solid particle or other which had gained admittance to the shell. It was as if the irritation of the particle induced the mantle to secrete around it layers of the mother-of-pearl substance by way of rendering the foreign body harmless. In the case of the pearl-producing molluscs the real jewel was thus formed while in others the "Pearls" were of course valueless. The Chinese have been accustomed to introduce into the shells of big molluscs little metal images, which become coated over with the pearl secretion and are thus rendered presumably more attractive. So that scientists assert that the pearl is really in one sense an abnormal thing, in that it represents the physiological resentment of the shellfish against a particle which has no business to be where it is.

Dr Jameson's discovery in this light is of a singularly interesting nature. For he tells us that the nucleus or particle, around which a pearl is formed in most cases, is the larva or young form of a certain parasite which has found its way into the shell. The parasite is a fluke, and is therefore allied in its nature to the animals of that name which we find familiarly infesting the liver of the sheep and the ox. The flukes whose youthful forms gain access to the shells of the molluscs are found as unbidden guests in the eider duck and in the Scoter duck. The life history of the parasites, as far as we know it, shows us that on escaping from the egg the young forms seek the water. Then they require to pass into the body of another animal than that in which they become mature in order to undergo the preliminary stages of their development. In the case of the sheep-fluke, we know that it passes the days of its youth in the body of the water-snail; and so in the case of the flukes Dr Jameson describes we may suppose their young select the mussels as their temporary hosts.

It is when the young fluke in the shell comes to grief, and its body degenerates into a limy speck, that it forms the nucleus of the pearl; but occasionally it will bore its way out of the pearl and thus leave the latter presumably imperfect. Dr Jameson has succeeded in infecting mussels artificially by keeping them in an aquarium. He also suggests that the real pearls of the oyster similarly originate from the young of the parasites which lodge within the shellfish. If infection of the pearl oyster could be rendered possible and swarms of parasites could be liberated in an oyster-bed doubtless the artificial production of the precious stones would become a feature of commerce. But it seems to me that, just as the diamond is only carbon after all, so our beautiful pearls parallel its case by owing their origin to the work of a low form of parasitic life.

THE TEA TRADE WITH PERSIA.

In your issue of the 1st instant, under the above heading, appears an extract from an official communication from Meshed, suggesting that the Indian Tea Association should, for a time, turn their attention towards the Bombay Agents of Persian firms, who might be won over to the advantage of buying tea at some place nearer the producing tea gardens than Bombay, and of the land route as against the sea route. As an old resident of Teheran, I have watched with interest the various proposals made and the action taken by the Indian Tea Association in the matter. The Nushki-Seistan route is being boomed to an extent which it certainly does not deserve, for what reason I am at a loss to understand. Those interested in the tea trade with Persia, should, in my opinion, use their utmost endeavours to popularise Indian tea in such parts of Persia as are already to an extent supplied with Indian tea, and where British influence is in the ascendant; they should not commence operations in such parts of the country as are solely under Russia's influence, and where necessarily the markets have already been captured by Russia to a certain extent. First assault and capture the outer works, before trying to take the enemy's stronghold. It is not much use trying to win over the Bombay Agents of Persian firms, where, no doubt, vested interests would be at stake. The best plan by far would be to send out an agent with a supply of tea to travel through the country to be exploited, and to cultivate the already established taste for such teas. When this is accomplished, the Bombay Agents would of necessity be obliged to buy such teas to meet the demand which would arise.

The towns in Persia I would advocate an agent visiting are Bushire, Shiraz, Kerman, Ispahan, Yezd Teheran, Kermanshah and Hamadan—all great commercial centres. The less said the better about

such a fatuous idea as the land route being so much superior in every respect to the sea route. During my stay in Persia this matter was never once referred to by my Persian friends and acquaintances, some of whom were keenly interested in the tea trade ; this supposed superiority must be put down as one of the ingenious but fallacious arguments of the boomers of the Nushki-Seistan route. In the official communication already referred to, mention is made of every man considering his cup of tea a necessity rather than a luxury. This is not literally correct, as the Persians do not drink tea in the same manner as we do. At many street corners of every town in Persia, there are restaurants or shops for the sale of drinks, where a customer can also obtain a smoke from the *kalian*. Usually music of a sort is also provided, the musician being only too glad to perform in return for a drink and a smoke. In each of these restaurants there are one or more brass samovars (Russian urus) continually on the bubble. A small quantity of tea is placed in a China teapot, which is filled with boiling water from the samovar, and then placed aside to brew. On a customer calling for tea, it is poured out from the teapot in a small vase-shaped glass, which holds about 2oz, a piece of loaf sugar is added, and the glass and a small spoon are placed on a china saucer and handed to the customer. Persians do not add milk. To show special honor to a customer, the lump of loaf sugar should project out of the tea like an iceberg. The Persian likes his tea sweet.

Should any enterprising individual or firm be contemplating a campaign with the object of establishing a tea business in Persia, I should be only too happy to place my knowledge and services at their disposal, as the country and people are to me most interesting.—TEHERANI, Sambalpur, C. P., in the *Statesman*.—*Indian Gardening and Planting*, May 8.

THE LIFE-HISTORY OF HELOPELTIS THEIVORA.

NOTE ON A DISPUTED POINT.

(*By Harold H. Mann B. Sc.*)

As is well-known, *Helopeltis theivora*, the " Tea Bug of Assam" as it was called by Mr Wood-Mason, the "Mosquito Blight" as it is generally termed—is the most alarming pest which has yet appeared on tea cultivated in India. It causes the more disquietude as it tends to increase as years go by,—fluctuating according to season, but generally increasing, and invading new areas. During 1901 which was a particularly bad year in almost all districts subject to the pest, a very moderate estimate gives seven lakhs of rupees as the nett loss to the Indian Tea Industry from this cause alone.

Though we have a knowledge, thanks to Peal, Wood Mason, Dudgeon, Watt, and Green, of the general life-history of the insect from the egg to the adult stage yet there remain several points which have been very obscure. Of these the most important is the question as to what becomes of the insect during the time when it apparently disappears from the tea bush. So complete is this disappearance, as a rule, that most planters living in affected districts in North-East India have hardly ever seen a single insect during January, February and March. Mr Dudgeon has suggested that it hibernates in the ground but offers no evidence for his position, and declares frankly that he had not been able to verify his conjecture. It has also been supposed that hibernation takes place in water and swamps, but again, not a scrap of evidence in favor of the view exists, and the same may be said of the very general idea among tea planters that in the cold weather the *Helopeltis* goes on to various jungle trees.

With a view of acquiring information on this point I have spent considerable time in January, February and March of the present year in two of the districts most affected by the pest—the Darjeeling Terai and Cachar—at a period, that is when the insect was supposed to be hibernating. As a result I have come to conclusions of which the following is a summary :—

The *Helopeltis theivora* can be found on the tea bush in every stage of development during every period of the year. The cold weather kills off the bulk of the mature insects and practically all the larvæ, but at all times sufficient remain to carry on the pest to the next season, and in addition the bushes are full of eggs. These latter were found not only in the usual position on the young shoots but also at a much lower part of the bush than has previously been noticed, embedded in the usual fashion in the midrib of the large mature leaves. The larvæ were found on 11th January in small numbers on unpruned and sheltered bushes, then forming about 2½ per cent of the total number of insects caught. By 12th February, however, a very different proportion of adults and larvæ was obtained, and now instead of 2½ per cent the larvæ formed 80 per cent of the total catch. This proportion was approximately kept up during several weeks from that date. The difficulty in obtaining evidence of their presence at this time is due to their attacking almost entirely the slightly shaded young leaves, the surface growth being rarely attacked in the early part of the year.

The insect could, further, not be found on any jungle plant at this time. Though jungle of very miscellaneous character was systematically searched both by myself and by the children who are regularly catching the insect, not a single one was discovered in any form.

It appears, therefore, evident that there is, from present knowledge, no need to assume a hibernating stage at all for *Helopeltis theivora*, and that the insects remain and can be found in every stage of growth, from the egg to the mature female full of eggs, at all times of the year. Whether the egg found low down in the bush, as described above, can be considered as a special hibernating egg, I can hardly say, but there certainly was no difference in structure or in method of deposition from that usual during the regular season. Inasmuch, then, as there is absolutely *no* evidence of the cold weather being passed by the insect in the soil, in water, or on other trees, and furthermore, as careful observation can always detect the insects and their eggs on tea bushes in affected districts, there is no need to imagine any hibernation stage at all in India, and beyond a certain retardation in development, due to the reduced temperature, the reproduction of the insect may be considered to take place in a similar manner throughout the year, and to be carried out on the tea bush itself during the whole period.

These observations have a very practical interest, and may lead to a sound method of attempting to deal with the pest, and experiments in this direction are now in progress. HAROLD H MANN.
—*Indian Gardening and Planting*, May 8.

VANILLA CULTURE IN BENGAL.

We have in previous issues referred to the experimental cultivation of the *Vanilla planifolia* in the gardens of the Agri-Horticultural Society of India. It may interest our readers to know that the Vanilla plants are making most vigorous growth, and have fully established themselves on the stakes. The manner of growing the plant on a commercial basis was fully described by us just

a year ago (*vide* issue of 9th May 1901, page 330). All the older vines are laden with pods of fine size and substance, many of the pods being over nine inches long already, and have another four months yet to grow in.—*Indian Gardening and Planting*, May 8.

THE RUSSIAN TEA MARKET DESCRIBED.

BY A RUSSIAN TEA MERCHANT.

Mr. T. C. Tchokoff, the Acting Russian Vice-Consul's address to the "Thirty Committee" last week, was to the following effect, Mr Tchokoff clearly setting forth his views under three heads:—

1 The favourable condition just now for buying tea on the Chinese market.

2 The under-fermenting of Ceylon teas intended for the Russian market.

3 The demand at present in Russia for low-grown tea.

4 The necessity of the one-pound draft to be allowed as done in London.

5 The improving of tea chests for shipment.

6 The means of advertising Ceylon tea in Russia.

MOMENT FAVOURABLE FOR BUYING IN RUSSIA.

Let me now look into the above-mentioned questions.

1 Talking of the favourable condition just now for buying tea in China, the tea market for Russia, you are, of course, Gentlemen, all of you aware, that at the present moment the cost of silver is about 20 per cent lower than it was a year ago. Take the average price of China tea paid by Russian buyers last year—it was about 20 taels per picul, which at the present low exchange would be 30 cents per pound on the local market.

Now I have information by wire from Hankow that they expect a very large crop this year and I don't see any reason why the average price in China should be higher this year than last year. The average I paid here last year for Ceylon tea was 42 cts. per pound and, reckoning with the present condition of the local market, I don't think that my average will be lower this year; thus I shall have to pay twopence more for Ceylon tea than for China tea, always considering the exchange and the lower price of silver. If I mention this, Gentlemen, I do it to show you how keen I expect the competition to be in Russia between China and Ceylon teas this year, and how every effort must be made to maintain the Ceylon tea at the place it has already attained on the Russian market.

CEASE UNDER-FERMENTATION OF CEYLON TEA FOR RUSSIA.

2. One of the measures to this effect I should think would be to stop the under-fermenting of Ceylon tea intended for the Russian market. We want the Ceylon tea for blending with China tea and therefore we require all its primitive vigour, especially so as teas in China are, owing to the low prices, manufactured very weak. Adapting Ceylon tea to so-called Russian taste by making it, through underfermenting, more like China tea is, in my opinion a decided mistake, as pure Ceylon tea is, up to the present date, sold in Russia in very small quantities.

RUSSIAN DEMAND FOR LOW-GROWN TEAS.

3. At the present moment the demand in Russia is mostly for cheap grades and, therefore, the low-grown teas if well fermented, when they are very appropriate for blending, ought to be more energetically pushed on the local market than has been done.

NECESSITY OF THE ONE-POUND DRAFT.

4. In my opinion it will have to be done sooner or later, that a draft of one pound per package should be allowed, which I am quite sure will be greatly appreciated in Russia. We must all of us not forget that every buyer in London has not only this privilege but also a three months' credit, which considerably acilitates business.

IMPROVED CHESTS WANTED.

5. Don't you think, Gentlemen, that the chests, in which the tea is packed and shipped, might be improved upon? I often do not buy tea from estates, where the packing, to my knowledge, is unsatisfactory. As to the means of advertising Ceylon tea on our Russian market, I don't think that any special activity on the part of the agents would be of any great use.

THE TEA BUSINESS IN RUSSIA

is practically in the hands of a few leading firms in Moscow and St. Petersburg who have a full insight into the qualities of Ceylon tea and who at present buy it on the London and local markets, selling it themselves to smaller firms. To try to enter into direct communication with these smaller, would-be buyers, through agents or with consumers even, by establishing tea kiosks etcetera, is not only, in my opinion, a perfectly useless and hopeless spending of money, but is sure to lead to displeasure on the part of the principal firms, the buyers of Ceylon tea, and in that case they are sure to look for other markets to get their tea from, for instance from India.

THE LEAF.

One more point, Gentlemen, I should like to draw your attention to, and that is the leaf; a small, carefully rolled up leaf is especially appreciated on the Russian market.

PLANTING NOTES

GREEN TEA.—Our contemporary's omniscience as to the best green teas for the American market, although no reports of the prices fetched by the new makes have been announced yet, is vastly amusing. We shall be interested to note the attitude it will take up when and if substantial eye-openers come to hand. Meanwhile green tea producers in Ceylon, who we were very glad to see had made nearly 750,000 lb. in four months this year, will doubtless better appreciate the *I.P.G.'s* most practical article by an "old planter" (reproduced elsewhere) better than half a column or a column of semi-second-hand editorials, such as appear in the local "Times" of last night.

THE HEMP TRADE.—A circular has been issued to the members of this trade drawing their attention to an act recently passed in the United States, entitled "Act temporarily to provide Revenue for the Philippines and other purposes." Under this Act (Section 11) the present export duty of $7·50 gold per ton is abolished in the case of hemp shipped direct to the United States, the effect being tantamount to the imposition of a discriminating tax on all hemp shipped from the Philippines to the United Kingdom and other parts of the world. The circular points out that "the grave importance of this matter to the rope-making industry of the country will be obvious. The fact of our manufacturers having to pay about 30s per ton more for hemp than their competitors in the United States constitutes a serious menace to the trade, especially as there would appear to be nothing to prevent the present export duty being doubled or trebled, should the United States Government think fit." It is suggested that it is in the interests of the trade that a memorandum on the subject should be submitted to the Foreign Office.—London *Times*, Apri 7.

THE CEYLON COMMISSIONER FOR EUROPE

EPORT FOR 1901.

I do not suppose it will be considered necessary that I should recount in my report for last year the impressions I have received, the information I have obtained, and the details of the methods adopted in the various countries which I have visited, to introduce and push Ceylon tea. All these details have been given in the numerous letters I have written from time to time to the Chairman of the Committee. I shall therefore give only as brief a summary as possible of the work done.

Travelling.—In the early part of the year I visited the West and South of Germany, Austria-Hungary, Northern Italy, South and West of France, and Paris. In the Spring I went to Saxony, and Central Germany; in the Summer to Northern Germany, Sweden, Norway, and Denmark: in the Autumn Switzerland, Paris, and a few towns in the North of France, and in the Winter to St. Petersburg and Moscow.

Mode of Operations.—I have presumed that the object of my mission is (1) to make Ceylon Tea known on the Continent, that is, to let the Public on the Continent know that Ceylon produces tea in large quantities, that Ceylon Tea is superior in every way to China, and any other tea; (2) to get the Public to taste the tea, and to show the Public how the tea should be prepared. With these ends in view I have confined my work entirely to the Trade. I have not been successful in France and Germany in inducing the oldest and largest first-hand Importing Houses to interest themselves sufficiently in Ceylon Tea to push it with their retail clients, or make a speciality of it. However, one Bremen Commission House has interested itself very considerably in the article. The reason of the abstinence of the large firms is obvious. They have an established trade in China Tea, and see no reason why they should act as missionaries in introducing a new article to their clients, especially when the profits on the new article are smaller than on the old. However, all the tea-importing firms in France, Germany, and Scandinavia import our Tea now, and I know of only two exceptions, one firm in France and one in Sweden, which refuse to have anything to do with it. I have worked mainly with the smaller importing firms, the dealers in the inland towns, the agents of London firms, and of Continental firms established in Ceylon. I have acquiesced in these firms carrying on the propaganda in the way in which they consider they will be most successful. No retail firm has received any support with the exception of one in Vienna, one in Florence, one in Naples, but these firms have for some years drawn their supplies of tea direct from Colombo. I have paid for no general advertising, and none has been done.

Germany.—Work in Germany has been carried on by three more or less different methods:

(1) By the help of a Bremen importing firm, which has endeavoured through their clients to establish depôts for the retail sale of Ceylon Tea.

(2) By subsidies to other dealers in the inland towns, who in their turn have carried on the campaign by newspaper advertisements on behalf of their clients, or by distribution of advertising material, post cards, circulars, leaflets, etc., and free samples of tea.

(3) By distribution of the pamphlet "Tea Cultivation in Ceylon" and other circulars to all the Trade and numerous Hotels.

As regards the first method, the firm in question has tried to induce its clients in Germany, Austria, and Scandinavia to take up and push our tea. So far they have established only three agencies in Germany, one with its centre in the Rhine Provinces, one in Breslau, one in Holstein. The first-named is a large coffee-distributing firm with 700 branches all over Germany; it possesses therefore special facilities for distributing the article. But in addition to these special agencies, this Bremen firm has induced several of their clients in Cologne, Baden, Strasburg, Leipsic, and Frankfort—who had never hitherto imported Ceylon Tea—to pass orders for and stock it. It has imported in 1901, 120,000 lbs. Ceylon Tea against 20,000 lbs. in 1900, but part of this increased import has been for Austria and Scandinavia.

From their appendixes A. C. D. & C. it will be seen that their clients had up to the end of the year (1901) established in Germany 756, in Austria 600, in Denmark 180, and in Switzerland 20 depôts for the sale of Ceylon Tea. The expenditure by these agencies in Germany has been confined entirely to illustrated circulars, and window placards. This scheme was discussed and formulated early in 1901, but it was only in the last three months of the year that the bulk of the circulars and placards were issued. I hope for good results but they will not be apparent for months yet. As I write, I hear that several new agencies have been started, and it is anticipated that at the end of 1902 all the Provinces in Germany will be assigned to agents.

2. In addition to these I have continued grants to the three firms who, induced by their Ceylon connections, have already been at work for some years pushing our tea. One of these is in the neighbourhood of Frankfurt, and draws its supplies of tea from the only estates which are owned by Germans in Ceylon; the second is in Stuttgart, and the third in Munich. They have all carried on a very active Propaganda, the Frankfurt people mainly, on the lines of distributing their circulars as a supplement of various special monthlies and weeklies. The papers they have chosen are some illustrated papers, and special papers for the Army, Navy, doctors, clergymen, railway employees, etc. In this way they have distributed 600,000 of their special circulars, and 100,000 of various other publications, and they have advertised in some 24 different newspapers. Their denunciation of China tea in their leading pamphlet is perhaps a little too forcible. Our object is not to make tea drinkers disgusted with tea generally.

Our Stuttgart and Munich friends have worked by means of newspaper advertisements, circulars, leaflets, photos, calendars, with views of Ceylon, and advertisements in special Ladies' Magazines and periodicals. They have also inserted one or two leading articles in a couple of newspapers. Stuttgart is able to report an increase of sales in 1901 over 1900 of 12,300 lbs., Munich of 800.

In addition to these three firms I have been successful in getting other three firms, one in Frankfurt, one in Berlin, and one in Konigsberg, to interest themselves in our tea. The Frankfurt and Berlin people have advertised it freely, and have brought out special labels for pure Ceylon tea in packets. The Konigsberg people have increased the proportion of Ceylon largely in their blends, none of which is now without a mixture of Cey-

on. All the three houses quote it at various prices on their Circulars and Price Lists. The Frankfurt House, which is one of the oldest tea Houses in Germany, will, I am glad to think, push Ceylon tea vigorously. Their import in 1901 exceeded that of 1900 by 10,600 lbs.

The third method of work in Germany has been the distribution of the Illustrated Pamphlets "Tea Cultivated in Ceylon." In 1900 the principal tea firm in Bremen advised me that, in their opinion, the very best way to introduce Ceylon tea was to get a series of articles published in the German Press, and that these articles should appear in all the Ladies' and Girls' papers, and in the Medical and Scientific journals, and be written from a semi-scientific point of view. I have had many interviews with this firm and some correspondence, but have not yet found someone to write an article of this description. In the meantime another gentleman has used the information I supplied him with, and published the pamphlet known as "Tea Cultivation in Ceylon." Up to date it has been distributed in Germany to 1,422 Hotels, 981 tea and colonial produce dealers 112 Sanatoriums, and 1,100 newspapers. I have seen notices of the brochure by 48 of these newspapers; some have devoted an article to it, others only a notice of a dozen lines. Four illustrated papers, with a circulation of half a million, have reproduced the pamphlet in its entirety, giving some of the illustrations. All these notices in the daily papers, and the reproductions in the illustrated papers, have been given gratis, and have therefore cost us nothing.

In Germany I have so far not been able to do anything by way of demonstration. I still have to find the proper parties to undertake this work. I am convinced we must get a wholesale or importing firm to interest itself in the undertaking before making a commencement. I am sorry the arrangements made for Stuttgart fell through at the last moment. I am in hopes we shall in a short time see Ceylon tea rooms in half a dozen of the principal German towns.

The Colombo export returns show an excess in 1901 of direct exports to Germany of 183,387 lbs. over 1900. Part of the exports to Germany is no doubt for transit to Scandinavia and Switzerland. The Colombo returns also give an excess of exports to Holland and Belgium of 11,868 lbs. The bulk of the imports into Holland and Belgium are for Southern Germany and Switzerland, the water transit by canal from Rotterdam and Antwerp being the cheapest way for goods to Basel, Baden, Wurtemberg and Hessen.

The German Custom Returns for 1901 give an increased import in Ceylon Tea over 1900 of 89,300 kilos, say 196,460 lbs., in Indian Tea of 43,200 kilos, say 95,040 lbs., and from Great Britain of 124,300 kilos. I think we may safely assume that quite one-third of the supply drawn from Great Britain is Ceylon tea, so the increase in Germany of Ceylon tea for 1901 may be calculated at close on 270,000 lbs.

Appendix "A", prepared for the information of the Committee, shows that the total expenditure in Germany by the various agencies engaged in pushing Ceylon tea has amounted to 39,261 Marks, 94 Pfennige, to which I have contributed 14,779 Marks. 90 Pfennige, and out of this latter sum 1,500 Marks have been paid in consideration of expenditure undertaken in 1899 and 1900. The actual contribution for 1901 is 13,279 Marks, 90 Pfennige.

France. Work in France in 1901—may be divided into two classes: (1) General advertising and trade propaganda. (2) Demonstration.

The former has been carried on by six different firms, and the bulk of the Propaganda has been done by the two houses which interested themselves so largely in 1900, in Ceylon tea, both during and after the Exposition. These two agencies have conducted a vigorous campaign in Paris, and have advertised largely in the newspapers and magazines such as the Mode Pratique, Lectures pour tous, Le Matin, Figaro, Echo de Paris, Femina, Le Journal, Bottin, Revue de Paris, Le Gourmet, etc., in all some 20 papers and periodicals have been used for general advertisement. But the bulk of their expenditure on general Propaganda has been in their outlays for, and grants to, grocers, supplying them with window signs, placards, free samples, etc., and in Menu Cards to Hotels and Restaurants. The third firm, which runs a large tea room in Paris, has issued cards, circulars, and leaflets, and continues to see only Ceylon tea in cup in their Tea Rooms. The fourth house confines itself entirely to grocers in Paris, and has given them leaflets and small presents of perfumery and other articles in return for all orders for Ceylon tea. The fifth agency, a Paris importing house, has confined its work entirely to the provinces and has issued special circulars to all its clients, has distributed 2,000 placards to grocers, and given 500 kilos in free samples of tea. This firm has also canvassed all the regiments in France by circulars. The sixth, a small firm in Marseilles, has confined itself to distribution of leaflets and copies of Mr. Bamber's pamphlet in French.

But in addition to the above very important work carried on by the trade through the trade mainly, another, *demonstration*, viz., the presentations to the public of Ceylon tea in cup properly made, has formed a special feature of last year's work. One firm opened in April a first-class tea room, beautifully furnished and well equipped, and went to the expense of obtaining Sinhalese boys from Ceylon as waiters. This room in the Rue Caumartin has been crowded during the autumn and winter months, and is one of the best advertisements we could possibly have. The same firm had a very large room nicely decorated and furnished at the Exhibition of L'Enfance a travers les ages, held at the Petit Palais in the spring. This room was well attended. This firm also had a bar and show at the Tuilleries Exhibition for one week. Another firm has been instrumental in starting a small and unpretentious, but useful little tea room on the south side of the Seine. We have therefore now four tea rooms in Paris selling only pure Ceylon Tea in cup. In addition to the Paris work, the last-named firm has started a demonstration round in the Provinces. We recognise that it would hardly pay as yet to run tea rooms in the Provincial towns, but with a view to let the inhabitants taste tea, properly made tea in cup has been distributed free of charge in the afternoons in those grocers' premises, who were willing to give space for this purpose. Twenty-two towns have been visited by the demonstrator, and up to the end of last year demonstrations have been given in 16 of those towns for 78 days, 16,483 cups of tea have been served, 9,200 visitors have bought dry tea, and the Paris firm has secured 56 new grocers as clients for their teas. The demonstrations have been well advertised in the local papers of each town, large posters have been displayed in the grocers' windows, and 529,350 copies of printed matter and leaflets have been distributed. This work has been very

hard and arduous, and I wish the demonstrator could have had more help. We ought in fact to have had two men, not one. This work is now being continued in the East of France. The opinion of the grocers in whose establishments the demonstrations have been held, is that no better advertisement of Ceylon tea could have been given, and although they admit that the sale of tea is very small, they all seem now prepared to push Ceylon tea in their sales in preference to China. A very great deal of money has been spent by our friends in France on the campaign last year, though my contribution has been proportionately much less than in the ther countries. A sum of 84,409 francs and 02 centimes have been spent on general Propaganda and demonstration, to which I have contributed 21,896 francs 11 centimes. On the installation and equipment of three tea rooms 64,926 franes 05 centimes has been spent, to which I have contributed 5,500 franes for advertising purposes. In France those who have taken up Ceylon tea have certainly shown their interest in the article by the way in which they have found funds for advertising the tea. With the exception of 3,510 francs, no travelling expenses have been included in the sum of 84,409·02 francs. All the six houses aetively engaged in the Propaganda report an increase in their sales varying from 5 to 40%. Returns of 7½% in tea on amount of tea imported. has been made to fifteen firms, who have imported Ceylon tea into France during 1901. I fear the withdrawal of any return in 1902 will eheck the imports of Ceylon tea in France for the current year. Many of the above Firms, though unwilling to push Ceylon tea, have no doubt been tempted to take it up on aecount of the return, and use it for mixing purposes. I should have liked to have a given a 3 or 4% return this year.

The only figures as yet available for 1901 are those for the direct exports from Colombo to France, and these show a falling-off of 8,934 lbs. and I fear that the imports from London for 1901 will show a larger reduction, as there can be no doubt that towards the close of 1900 heavy importations were made in order to obtain the full benefit of the large return made in that year.

The French returns for 1901 will not be available till the autumn, but those for 1900 are disappointing. They are as follows:—

Country of Export	1899	1900
England	168146 kilos.	197952 kilos.
Belgium	1465 ,,	2152 ,,
British India	124698 ,,	144002 ,,
China	523064 ,,	591001 ,,
Other Countries	21422 ,,	27288 ,,
Indo-China	46015 ,,	130275 ,,
Other Colonies	116 ,,	656 ,,
	884926 ,,	1093326 ,,

According to the above return the increase in *all* tea from England was 29,806 kilos or say 65,573 lbs. whereas the London brokers' returns give the increase in Exports from the United Kingdom in 1900 as 49,244 lbs. for Ceylon, and as 38,537 lbs. for Indian, or an increase in export of British-grown teas alone of 87,597 lbs., the figures being:

Export to France	1889	1900
Ceylon	83867 lbs.	133111 lbs.
Indian	50537 ,,	88890 ,,

I have not got the figures for the direct exports from India, but from Ceylon they were as follows:—

in 1899	1900
98952 lbs.	326800 lbs.

or an increase of 227,848 lbs. The increase as per the French figures from all British India, whieh I presume includes Ceylon, is only 19,904 kilos, say 43,788 lbs. Even if we deduct one-third of the increase in Export from Ceylon, say 76,000 lbs. as being in Bond, or on the water, there still should remain an inercase of over 150,000 lbs. from Ceylon alone for 1900 over 1899. I therefore fear the French figures are not altogether reliable so far as country of Export is concerned. The increase in the imports from Annam is very great, over 184,000 lbs. and I believe that for 1901 the increase exceeds 250,000 lbs. I do not believe the acreage in bearing under tea in Annam is capable of giving this large Export. One of the Importers has admitted to me he has received a lot of stuff which was not tea at all, and I know that the quality has been so bad that three or four of the biggest importers vow they will import no more. I cannot help thinking, however, that teas have been brought to Tonquin from other parts of China, and exported as Annam to enable them to secure the benefit of the much lower duty on French Colonial products.

Belgium.—In Belgium very little has been done. Two dealers have begun to advertise our tea through their clients and are able to show an increase in imports of 12,100 lbs. over 1900. They have spent 2,000 francs against a subsidy of £30, say 750 francs. When the war in South Afriea is over, I think Holland offers a very fair field for Ceylon tea, as its consumption of tea per head of the population is the next largest in Europe to that of Great Britain.

Austria.—Work in the Austrian Empire has been carried on through 5 agencies. Three of these firms have their centres in Vienna, one in Trieste, and one in Basle. I have granted support to four out of the five. The Trieste firm received no subsidy. This firm being a Commission House took no direct part in propaganda work or advertising, but they have interested themseves in our tea by importing and selling it, and financing the dealers when necessary. Two of the Vienna firms have been connected with Colombo for some time, the principal one being directly interested in a Colombo House. This firm commenced the importation of tea into Austria a couple of years prior to 1901.

In addition to the grant for 1901, I have given them a grant in consideration of the work and outlay incurred by them in 1899 and 1900. I have no doubt that it is mainly due to their extensive advertising that others have come forward and taken an interest in this article. The other firms, being already in the tea trade, have perhaps obtained more successes in the way of increase of imports and number of depôts for sale of the tea, and thus have reaped the benefits of the more extensive advertising done by our Colombo friends. This firm has advertised in 44 different newspapers and periodicals, has issued 20,000 special cicurlars, put up 2,000 posters, put up special posters in the railway stations, has a standing advertisement in the Volks Theatre, ete. It has been suecessful in securing four members of the Imperial family as regular clients and has distributed 25 copies of Cave's "Golden Tips" to leading and influential personages in Vienna. In addition to its generel propaganda amongst the trade and public, it made a most attractive show at the Food and Agricultural Products Exhibition held at Karlsbad in August and September, and obtained the gold medal for its tea; 45 lbs. of tea in oz. packets were distributed free to the visitors.

The second firm is that of an old-established retailer, who has the sole agency for many food specialities. He has for many years drawn a very small supply from Colombo direct, and was very anxious to enter on a more vigorous campaign and push the sale of the tea. He has not only advertised in some 20 newspapers, but has issued leaflets with deliveries of his other articles, has issued Post cards with advertisements of Ceylon tea, and been successful in getting special articles on the advantages derived from drinking Ceylon tea inserted in the Press. He has also circulated Mr. Bamber's pamphlets.

The third firm, being an Austrian tea importing firm, has confined itself entirely to grocers, has advertised on behalf of these grocers in 73 papers in the Empire, has established 600 depôts for sale of Ceylon tea throughout the Empire, the tea being put up in 2 oz., 1/4 and 1/2 lb. packets, and sold under a special brand of their own, and has issued 66,300 circulars and 1,350 placards to their clients for distribution.

The fourth firm working from Basel has done little direct newspaper advertising, but has granted its clients small sums for that purpose. It has furnished the restaurants with note blocks for their bills, the back of which contains an advertisement of Ceylon tea: it has given Menu Cards to the Hotels, and has supplied the shops with signs, cards and leaflets for distribution among their customers. It has also distributed a large amount of tea free, as samples. The expenditure in Austria in 1901 has amounted to £1,703-19-8, to which I have contributed £1,032-9-2 No mention is made in the London brokers' returns of the Export from the United Kingdom to Austria. From Ceylon the figures are 50,958 lbs. in 1901 against 24,633 in 1900. The increase is so far satisfactory. The Austrian Customs returns give the figures as 52,200 kilos in 1901 from India and Ceylon as against 41,700 kilos in 1900, or an increase of 25,300 lbs. in last year. From Great Britain the total import in 1901 was 25,300 kilos as against 21,200 in 1900. I think we may assume that the bulk of what was imported from Great Britain was British-grown tea. But even assuming it was all Indian and Ceylon, the total importation from these countries is only 78,500 kilos out of a total 1,023,800 kilos. So we have in Austria some very heavy work before us, to even displace the bulk of China tea, as British grown teas do not form as yet one-tenth part of the whole import. I regret to see that total imports into Austria for 1901 show a falling-off of 41,5 0 kilos, as the total import for 19 0 was 1,065,20 kilos. I am glad therefore to see that the reduction has not taken place in the quantity imported from Great Britain, or India and Ceylon.

There is a very fashionable tea room at the Hotel Bristol in Vienna, the proprietor drawing his supply of Ceylon tea from London. In the Spring we shall have a small demonstration at a Charity Bazaar under Imperial Patronage in Vienna, and I hear special Ceylon tea rooms may be started in Vienna and Buda-Pesth in the coming Autumn.

SCANDINAVIA.

Work in Scandinavia has been carried on in Sweden and Norway by three firms in Stockholm, who for the past two or three years have interested themselves in the article at the instance of their Ceylon friends; in Christiania by the same firm who received support from me last year, and in Denmark by a new firm who took up the article for the first time in 1901. The oldest and largest Swedish firm have been at work for some years now, and they, with their branch House in Christiania, have advertised on the largest scale. The lines on which our friends in Sweden and Norway work are varied; while one firm has confined itself mainly to newspaper advertisements and posters, and the third (the largest) to work amongst grocers, supplying them with tins and canisters, signs and advertising material in the shape of leaflets, and pamphlets for their clients. All these agencies practically keep and sell only Ceylon tea.

In Copenhagen a new firm have taken up the pushing of pure Ceylon tea under a special brand of their own. They have advertised in 73 different papers and issued 63,600 circulars and established 180 depôts for the sale of Ceylon tea.

I notice that the direct exports to Sweden from Colombo in 1901 show a decrease of 6,196 lbs. I presume the export to Denmark is included in that under Sweden. Although the direct exports may show this falling-off, I feel certain a very much larger quantity of Ceylon Tea has been imported from London. One firm alone has drawn 10,000 lbs. from London in 1901 in excess of its 1900 supply from the same place, while another has taken nearly 10,000 lbs. more from Germany in excess of 1900.

From appendix "D" it will be seen that the total expenditure on advertising and propaganda in Scandinavia has been £944-10 1, to which I have contributed £289-3-3.

Afternoon coffee is not a Scandinavian custom, and I fear afternoon tea rooms would not be a success in these countries. But I think an effort might be made to introduce the sale of Tea in the Russian fashion per glass, as tea made very weak and sold per glass at a low rate in the winter ought to popularise the beverage amongst the masses in these Northern Countries.

Switzerland and Italy.—In Switzerland the extensive advertising and efficient work undertaken in 1900 by a Basel firm has caused all the other tea dealers to bestir themselves, and not only those who have hitherto made Ceylon tea a speciality, but also others have been compelled to take up Ceylon tea and at any rate stock it. Not less than seven firms have been willing to advertise it, and I have given assistance to six out of the seven. Our friends of 1900 have continued their work with the grocers in the smaller towns, and have given them help to advertise the teas; they have also continued the campaign with the Hotels and Restaurants. They made special demonstrations at the International Shooting Contest, "Tire Federal", held at Lucerne, and at the Cantonal Exhibitions held at Vevey and Basel, and have aided in the establishment of a Ceylon tea room at Lausanne. Another firm has made Ceylon tea a speciality for the first time by selling a pure Ceylon tea in packets under their own Brand. They have issued some 60,000 special circulars, advertised on behalf of their grocers for 6 months in the local papers, and given their clients 600 placards.

The third firm, an old established Swiss firm, has also taken up Ceylon tea as a speciality for the first time. Their work is entirely confined to grocers. They have distributed 20,000 circulars, advertised in 25 different newspapers on behalf of their clients, and established 50 depôts in 20 places.

The fourth is represented by a gentleman who has for some years sold Ceylon tea. Many years ago he

lived in Ceylon for six months, and although his business is small, he takes a great interest in the article.

The principal partner in the fifth firm is a gentleman who from his position, wealth, and influence can give us a great deal of help: As a large Export Merchant he does a large trade with Ceylon. His sale of our tea is entirely retail, and he has issued a large number of circulars and distributed a quantity of Bamber's pamphlets.

The sixth firm may be said to be the pioneer of Ceylon tea in Switzerland, their present manager having been resident in Ceylon as a planter for many years: they keep Indian and China to prevent their clients going elsewhere for those sorts, but by far the bulk of their trade is all Ceylon. In addition to their customary propaganda by circulars and price lists, the feature of their work last year was special lectures on Ceylon tea delivered by the manager in 13 towns in Switzerland. These lectures have been illustrated by magic lantern views; free samples of tea, and tea in cup have been distributed at them.

The seventh, a London firm, has established a tea room in St. Moritz. Full particulars of the undertaking and vouchers for the expenditure have not reached me as yet. In Italy, this same London firm received a small advance to commence work through a firm of colonial produce brokers in Genoa, but no particulars of the expenditure have as yet come in. At the instance of a Colombo export firm small grants were made to firms in Naples aud Florence. Their expenditure has only just begun, and has been confined to a view advertisements in papers and tramcars. One of the Basel firms has entered Italy and has commenced work with the Hotels and Restaurants in Nothern Italy. This house is able to report an import of 8,734 lbs. into Italy against nil in the previous year. Only four out of the seven firms working in Switzerland have furnished me with particulars of their imports for 1901. I see that their total increase over 1900 amounts to 20,963 lbs. The expenditnre in Switzerland in Italy amounts to £1,054-4-2, to which I have contributed £476-1-9. But in return for this year's grant, one firm has still to spend £160 in Switzerland, and another should render accounts for £150 to be spent in Italy.

Russia. I only visited this country in order to make the necessary preparations for the Ceylon tea room at the Exhibition to be held during the summer at St. Petersburg. I took the opportunity to visit Moscow, and while there I called on all the principal importers. The unanimous opinion of the Russian houses was that our tea was doing very well in Russia, and required no outside help to stimulate the expansion of its consumption. Messrs. Rogivue & Co. think otherwise. My stay in Russia was not long enough to enable me to advise or say in what way any further propaganda on behalf of Ceylon tea should be made. That the great mass of the people know nothing about Ceylon and its tea is certain. I think special Ceylon tea rooms in Moscow, St. Petersburg and three or four of the largest towns would do good, and help to popularise our tea. But I should be very careful not to offend the susceptibilities of the trade. If, however, anything special is to be done in Russia, it will have to be on a very large scale and be continued for some years. I am inclined to think that a rebate or return of 1 or 2% to the Importers would probably have more immediate results than any other method. Tea in Russia is drunk so weak that one might almost call it hot water flavored with tea, lime juice and sugar. It is, however, a most palatable and agreeable beverage at all times, especially in the cold winter months. Our object is not so much, as in the other countries of Europe, to get the inhabitants accustomed to the taste of our tea, but to show the Russians that in the long run it is much the cheapest, because a little of it goes further. Although Russia imports about 108 million lbs. of tea, the consumption per head of their population is only 0·82 lbs., therefore the cheaper the article can be given to the public, the greater the chance of an increase in consumption. There is not only no chance of obtaining an equalisition of the duty on sea-borne as against overland tea, but I see statements in the English newspapers to the effect that from this year, in order to bring freight to the Siberian Railway, the duty will be abolished on all teas entering Russia by the Siberian frontier. In the meantime the Russian Importers advise me they would buy more of our teas if, 1st. the net weight of the packages ran more evenly. I have great complaints on this head. They insist they are always coming to grief with their clients over the difference between the Invoice and actual weights. 2nd. If quality were always uniform. Complaints have come from the interior as to difference in quality, not only in one line of tea, but in single packages of one line. Single chests supposed to contain Pekoe, for instance, have been found to contain dust and coir yarn. 3rd. If Colombo prices were more on a par with London. They cannot understand why the London market is always cheaper than Colombo. They would buy more in Colombo if the prices were equal, as the idea of buying in London does not commend itself to some importers. I venture no opinion as to whether the London market is cheaper or dearer. I merely pass on the opinion of the Russian dealers. They are all unanimous in thinking there is a future for Ceylon tea in Russia, provided the quality be maintained. The expenditure of £270 in Russia has been solely in disbursements for the tea room at the exhibition.

Spain.—I mention this country simply to note the fact that the Colombo export returns show a falling-off of 17,480 lbs. in the export to this country in 1901 as compared with 1900. I think it will be found that the reason for this is that the bulk of the export in 1900 was for the Army and Navy Contractor in Gibraltar, and that supplies, hitherto drawn direct, have in 1901 been obtained from London, the excessive and irregular freight from Colombo to Gibraltar rendering it unprofitable to continue to obtain direct shipments.

Conclusion.—In conclusion I would like to express my, opinion that with one single exception in Switzerland and Italy, I am convinced I have received very full value, both in work and money, for the grants I have made. I feel certain the funds have been well and economically spent. What the result will be it is impossible to say. I do not believe we shall ever—at least not in the time of this generation—see France, Germany and Austria tea-drinking countries to the same extent as Great Britain, but by quietly pegging away, I think we shall in course of time oust China tea in all the three countries, and in Germany and Scandinavia I hope we shall do more. My correspondents in France, Austria and Germany are most hopeful, and notwithstanding the fact that, owing to the general trade depres-

sion and the very mild winter, the tea trade in Austria and Germany was bad last year, yet they think there is a decided future for Ceylon tea, provided quality be maintained, and if possible improved. I reserve my opinion as to what should be done in Russia till after the Exhibition is over, but I do not advocate the spending of any large sum to make a "splash" either in one or in all the other countries. The expenditure should be confined to induce the trade to push the article, and to demonstrations, and we should keep steadily and quickly at the work for some years. It must not be forgotten that, owing to the enormous increase in the world's coffee production, coffee has become very cheap. Coffee growers are doing what they can to find new outlets for their produce. Brazil has sent a delegate to Europe to see what can be done to develope the trade, and special efforts are being made to induce the Russians to drink more coffee.

I want to take this opportunity to acknowledge gratefully the kindness, help, and information given to me by Mr. Bennett of the British Embassy in Vienna, by Mr. Austin Lee of the British Embassy in Paris, and by the British Consuls in Stockholm, Christiania, Copenhagen and Stettin.

(Signed) J. H. RENTON.

Hamburg, 10th March, 1902.

(Letter from the Ceylon Commissioner in Europe to Chairman, P. A.)

TEA IN ANNAM.

Buckeburg, 16th March, 1902.

Dear Mr. Kingsford,—Since forwarding my report I have received through the kindness of the British Embassy in Paris the following communication from the French authorities as per translation herewith.

"According to information received from the Administration in Indo-China the figures given, viz.: 71½ hectares as representing the extent of acreage under tea in Annam, must not be considered correct. It is difficult to estimate the acreage exactly, but it is for all that sufficiently large to explain the production announced in the statistics (Note:—about 450 acres). In the Province alone of Bhin Binh there are 147 hectares and generally the cultivation of tea in Annam is developing rapidly. The local customs watches the exports to France with the greatest care, and grants no certificates of origin (of growth) without having obtained all information as to the exact source of the teas intended for export." My supposition that other teas from China were being exported as Annam teas is therefore wrong, but I think excusable, when according to the official figures the total acreage under tea in Annam was given as 71½ hectares. If my report is published, this letter should be published as well.—Yours sincerely,

(Signed) J. H. RENTON.

A. C. Kingsford, Esq., Rookwood.

OVER PRODUCTION.

It is wonderful in how many directions the evils of "Overproduction" are realized! We have just received the "semi-annual report," April 1902, of Messrs. Schimmel & Co. of Miltitz, near Leipsic and of London and New York, dealing with "Essential Oils," and this is what we read in regard to "Eucalyptus Oil":—"The trade in this product suffers from excessive overproduction, which, in spite of every warning, is carried on unflinchingly at the two principal sources of supply—Australia and Algiers—and which will lead to unpleasant consequences, if the production is not soon carried on in a more rational way." It cannot be very easy—however desirable—to bring producers, situated so far apart as Algeria and Australia, into line or to get them to combine to reduce their output of a product which depends so largely on epidemics of "influenza" to secure a profitable market. Still more surprising is the case of the French "wine crop" as we learn from a copy kindly sent us of a very able and interesting Report by Mr. Consul-General Hertslet on the District of Havre for 1901, and lately published. It seems that last year the yield of the French vineyards was much above the average. But so far from this being a subject for congratulation, the Consul-General declares that the excessive production has proved to be a source of disastrous losses to the wine-growers and from them has reacted with bad results on the whole trade of France. Here is the explanation as given in the Report before us:—

Consumption of wine, as a result of low prices and the removal of octroi duties, has undoubtedly increased, but it still falls far short of the immense production of the past two seasons. Stocks have accumulated, and as the poorer qualities, of which there was an unusually large production during the past year, will not stand keeping, prices have fallen to such a low figure as to yield the grower in many cases practically nothing. In view of the enormous extent of the wine industry in this country, the crisis has had far-reaching effects on the trade of the whole of France, and has contributed to a large extent to the general feeling of uneasiness and depression, even at places so far removed from the wine-growing districts as Havre and the ports of Northern France.

The tea planters of Ceylon and India have, therefore, many to sympathise with them in different countries, in their experience of the evils of over-production; for, to get a further illustration we have only to go to Mr. Hertslet's next paragraph dealing with "coffee," the trade in which with Havre had reached an unprecedented figure last year The Brazil coffee crop of 1901 2 is now known, to be by far the largest on record; but nevertheless speculation became active on unfavourable reports of the prospect of the succeeding crop coming to hand, and prices advanced considerably out of such speculations. At the same time, the stock of coffee in Havre was (in January) expected very shortly to reach a total of 3 million bags,—which is by far the largest quantity ever accumulated in one port and is as

large as the stocks held in the whole of the United States! It seems that the Brazilian crop of 1900 1 equalled 10½ million bags; 1901 2 is estimated to be at least 14½ millions; but 1902-3 is expected to fall to 8½ millions We should be inclined to doubt the latter figure; but taking the total for three years at 33 millions, and knowing that the world's consumption of Brazil coffee does not exceed 9 million bags a year—we see that there is the prospect of overproduction this year to the extent of 7 million bags, and without much chance of working this off next year except at ruinously low prices and, perhaps, an attempt to drive coffee into consumption at the expense of tea. It is clear that so long as coffee is abundant and cheap—"over-produced," in fact, more than tea—there is less hope of getting the fragrant leaf into increased consumption in "coffee countries" such as the United States, France and some parts of Germany and Austria. But there must come a great reaction in Brazil from the enormous outturn of this year. The ordinary planters there, many of them burdened by debt, cannot continue to produce coffee at a loss, and it is believed that already many are turning their attention to food products consumed in the country. The sooner the world's production of coffee is brought within the limits of consumption, the better will it be for an extended and extending demand for tea.

TEA AND COFFEE PUBLICATIONS.

We have received from Messrs. Henry T. Coates & Co., publishers of Philadelphia, three uniformly bound books written by Mr. Joseph M. Walsh, entitled respectively—'Coffee: its History, Classification and Description'; 'Tea: its History and Mystery'; and 'Tea Blending as a Fine Art.' We know that Mr. Walsh has had some of our Ceylon books: but they cannot have been of recent date; for his information in regard to Ceylon is absurdly out of date and he is strong about "the presumption and audacity of India and Ceylon tea-growers and dealers" in regard to the superiority of their teas. The following extract condemns his little book on "tea" as quite unreliable:—

The relative positions of China, India and Ceylon teas in England at the present writing being

Kind		Consumption, Pounds.
India (estimated)	...	105,000,000
China ...	...	50 000,000
Ceylon ...	...	35,000,000
Total	...	180,000,000

The same is true of the "coffee" compilation; for, Ceylon, we are told exports about 80 millions lb. We only wish she did. Mr. Walsh has yet to learn that tea has taken the place here of coffee. No doubt in regard to Brazil, Mr. Walsh is more reliable. His work on tea-blending has a good deal of useful information; but here again is an amusing paragraph;—

"CEYLON TEAS—Are comparatively new Teas to commerce, and are known to trade as Matagalas, Mandulsumas, Rakuwanas, Kanda-loyas, Kandapole and Soocanduris, but as with India Teas they are chiefly converted into silver and golden Pekoe, Congous, Souchongs and Pekoe-Souchongs. Their leaf, liquor and flavour like their India prototypes varies greatly in style and quality, according to the elevation at which they are grown, their uniformity also varying from year to year as in the India districts."

THE FOREIGN TEA TRADE OF CHINA IN 1901.

REPORT BY THE STATISTICAL SECRETARY.

The report of Mr F E Taylor, the Statistical Secretary of the Chinese Imperial Maritime Customs, upon the trade of China for 1901, with an abstract of statistics, has been issued from the Statistical Department of the Customs. Mr Taylor writes on tea exports:—The tariff export duties are in most cases very light, and tea is the only staple on which the duty is unreasonable. There was again a falling off in the export of the black tea, which only amounted to 665,499 piculs, the lowest on record. The crop was short, owing to heavy rains in April, but the quality was fairly up to the average. Green tea fell to 189,430 piculs, the supply having been shorter than for many years, and the quality was, on the whole, rather below the average. Russia is taking more India and Ceylon tea each year, and Foochow teas have now lost the markets in Canada and Australia. The export duty and *likin* raise the cost of low grade teas sometimes as much as 40 per cent., and while this continues there is no hope of checking a continuous decline in the trade. There was a further decrease in the export of black brick tea to 244,565 piculs—half what it was five years ago; but it is explained that Siberia is overstocked, and the new regulation that the heavy import duty must be paid immediately on arrival has checked importations until existing stocks are exhausted. Green brick tea rose from 31,334 to 48,957 piculs.

EXPORT OF TEA

The following are the figures for the two years:—

	1901.		1900.	
		Hk. Tls.		*Hk. Tls.*
Tea ...	1,157,993	18,512,826	1,384,324	25,444,801.

—*L. and C. Express*, May 2.

DESTRUCTION OF VALUABLE TIMBER IN SIAM.

"WHAT A FINE COUNTRY FOR TEA."

The destruction of valuable timber still continues on the mountains throughout the Northern districts. There is really no excuse for this. The mountain tribes could as well leave valuable trees standing, if they were so instructed; it would not interfere with the necessary amount of clearing to make their gardens. By the way, what a fine country for tea! There is abundance of water, and the hills are covered with splendid soil. The native tea gardens here are a success.

The annual destruction of young teak trees by forest fires is another matter worth attending to. Even the trees that live through it are injured so that their future value is decreased considerably. In fact a lot of the standing teak is worthless as timber, being crooked, hollow, short and stunted. There are large tracts of country going to waste that are exactly suited to teak growing, for this is the natural home of teak. All the valuable teak has been cut in the tracts above-mentioned. Nothing is left now but scrub stuff and other waste, with the fires every year destroying the seedlings that spring up of their own accord. No doubt the Forest Department is doing good: but it is poor policy to neglect all that territory draining into the Mekawng. Let me say here that in Muang Pan district, I am told; there are no restrictions placed upon the cutting of teak for use in housebuilding. This is very different from the unjust regulations in some places that hinder a man from using teak sticks that he cut in the olden time, squared and dragged. These can be left to burn or be stolen but the rightful owners cannot use them. —*Bangkok Times*, April 26.

PLANTING NOTES.

THE BURMA RUBY MINES.—The ruby mines of Burma are now worked by electricity, obtained from a mountain stream some three miles off. Finds of copper fish-hooks and other implements in the ground point to the present site of the mines and civil station having been a large lake in pre-historic times.—*Statesman*.

ARTOCARPUS HIRSUTA.—This fine forest tree has been introduced into the Agri-Horticultural Society's Gardens at Madras, from seeds supplied by Mr Ferguson, Director of the State Gardens, Travancore. It is a native of the Western Ghats, where it grows up to an elevation of four thousand feet. It yields a valuable timber, the trunk of a well-grown tree sometimes reaching a height of 150 feet, straight and clear. It yields the "angili" wood of commerce; while the concentrated juice forms a tough, light-brown wax, used in cementing broken earthenware and stoneware. It bears a fruit the size of an orange, containing a pulpy substance much in favour with natives.—*Indian Gardening and Planting*, April 17.

PLANTERS—are being repeatedly advised not to place all their eggs in one basket. The following is what Andrew Carnegie has to say on the subject of concentration:—"Don't put all your eggs in one basket" is all wrong. I tell you "Put all your eggs in the one basket and then watch that basket." It is easy to watch and carry the one basket. It is trying to carry too many baskets that breaks most eggs in this country. He who carries three baskets must put one on his head, which is apt to tumble and trip him up. It took me some time to learn, but I did learn that the supremely great managers, such as you have these days, never do any work themselves worth speaking about. Their point is to make others work while they think. I applied this lesson in after life, so that business with me has never been a care. My young partners did the work and I did the laughing, and I commend to all the thought that there is very little success where there is little laughter."—*Indian Planters' Gazette*, May 31.

AGRICULTURAL EDUCATION,—The Agricultural Education now in practice (though still very limited to what it ought to be), we hope will prevent visitors of the future being "instructed" in the products of the island as is being done at present, and of which the following is a sample: —A lady, who has been in Jamaica all her days, explained to a visitor, that "this is a Nutmeg, its covering is the Mace, *its stem is Cloves and the bark of the tree is Cinnamon.*" Truly a wonderful combination of spices.—*Jamaica Journal*.

ANTS AND ORANGE TREES.—According to the "Implement Age" of Philadelphia the orange tree has an enemy in Cuba in a large ant more than half-an inch long, having an enormous head provided before the mouth with powerful pincers, with which they despoil of leaves in one night the largest orange tree. The ants live in the sub-soil. They make large holes and very long galleries—sometimes 100 yards long. The method employed to kill them is to introduce an iron pipe, to which a large bellows is connected, into a hole made in the place where the ants enter the ground. Sulphurous smoke and gases are then blown through the pipe by means of the bellows, and the ants are destroyed.—*Globe*, May 10.

COCOA AND CACAO.—The latest illustration of the confusion arising from the use of similar spelling for the name of the palm and the fruit of the Chocolate plant, is afforded by the *German Export Review*. A recent number contains an excellent paper on "The Manufacture of Chocolate" with a series of very interesting illustrations, so far as the machinery, &c. go; but there is also the inevitable "Cocoa Plantation."; and instead of this being a grove of *Theobroma Cacao*, it is simply "a Coconut Palm Garden"! Now if all and sundry would only drop the "a" out of "Cocoanut" giving the *Cocos nucifera* palm the proper short name of "Coconut" for its fruit, we should soon find people understanding that "Cocoa" (as well as "Cacao" and "Chocolate") referred to the fruit of a different tree; and the confusion would erelong cease to exist.

THE DROUGHT IN AUSTRALIA.—Says the Melbourne *Leader*:—

As will be seen from our district correspondents letters, the present prospects are by no means as favorable as could be desired, owing to the continued spell of dry weather. The acceptable fall of rain with which the autumn opened gave hopes of a good season, but that rain wanted following up with more within a moderate interval. In the northern, as well as other districts, the grain sown has only had moisture enough to sprout it, and now the dry weather is so shrivelling the young plants that in many cases it is feared that resowing will be necessary. The drought is also much against the work of getting in the fodder crops, and those that have been sown are awaiting the rain, while the grass is also suffering. Even should rain now come the grass cannot do so well as at an earlier period, owing to the soil having parted with its summer warmth, and the time of the frosts approaching. A thorough soaking of the soil would, however, now be of the utmost value throughout Victoria, and to a greater degree all over Riverina, where the situation is becoming particularly serious.

A MAP OF PRECIOUS STONES,

BY H. L. HOLMES.

A map of France cut from the rarest jasper, flashing with costly jewels, and resplendent in gold and other precious metals! Truly a Royal gift worthy of both giver and recipient: from the Imperial Czar of All the Russias to the great Republican nation, his friend and ally. It is doubtful if the Czar could have chosen a gift more likely to prove acceptable to France and her people. An immortal map, which moth and rust can never destroy, appears to be a symbol of a nation that will live for ever. That the Royal giver had something of the sort in his mind when he selected his present is not for a moment doubted by the appreciative people whom the Czar thus honoured. It was when feeling between the two countries was warmest and most brotherly that the Royal Nicholas presented his unique gift. During the exposition of 1900 this map of jewels and gold was the centre of attraction so far as French visitors were concerned. For foreigners it possessed features that lovers of art and of the curious could not resist. Rarely, whilst the magnificent gift was on public view, was it not surrounded by a crowd which was always full of admiration and interest, and frequently of enthusiasm. Even now adorning, as it does, a selected position in the Louvre, it still attracts a great deal of attention owing to the circumstances surrounding its presentation as well as its magnificence of design and artistic finish. Besides it is claimed that there is nothing in the wide world like it: as a map it is unique. The French nation is proud of it. Even the usually taciturn officials who guard the priceless treasures of the Louvre wax, eloquent and discursive when courteously asked for a short account concerning it. This wonderful map was not produced without infinite pains. Thousands of Russian workmen and artists had a hand in the manipulation of its varied components. It was designed with the personal approval of the Czar, by the distinguished Russian engineer, De Mostovinko, who also superintended its production and completion. It was put together at the Imperial factory of Ekaterinburg. Months were occupied in the process. It was finished with as much care and correctness as the importance of its destination demanded. So pleased was the Czar with his map of precious stones that he warmly eulogised its designer and presented him with a decoration.

Perhaps the most interesting feature about this wonderful map is that every precious stone and jewel included in its production came from the Imperial mines in the Ural Mountains. Several of the stones are only found in those mines, and are appropriated by the Czar. Some of them are never found at all in commerce.

The map measures forty inches along each side and is framed in slate-coloured jasper. The sea is represented by a pale marble, and the portions of foreign countries necessarily included—England, Germany, Italy and Spain—are in dark grey. The whole is enclosed within a magnificently designed, heavy walnut case, elaborately carved and standing about eight feet in height. The formation of the various departments (or countries), as well as the surrounding seas and countries, is as perfect as that found in Governmental maps. The whole of France is shown entirely in polished jasper, and it will be found that each department (or county) has been cut from jasper of a different colour, the whole blending without the slightest offence to the artistic eye. The mines were ransacked in all directions for the necessary material to ensure this effect. The large number of counties thus represented will give the reader some idea of the enormous labour bestowed by the Czar's workpeople on this portion of the undertaking. The jasper used is all of the most beautifully veined that human eye has gazed upon. The polishing is perfect, the cutting of such piece must leave entailed the greatest care, so artfully are the joinings of the various departments concealed, so exquisitely do the lines meet. One hundred and six of the more important towns are given: the names in letters of pure gold, the towns represented by costly jewels. Paris is represented by a ruby of immense size and value, and it must cause commotion amongst those connoisseurs who make a pilgrimage to the Lauvre for the purpose of gazing upon this magnificent collection of precious stones. Havre boasts a beautiful emerald under its golden name, Rouen is represented by a sapphire, Lille by a phenacite (a rare variety of rock-crystal), Rheims by a chrysolite, Lyons by a tourmaline, Nantes by a beryl, Bordeaux by an aquamarine, Marseilles by an emarald, Nice by a garnet, Cherbourg by an alexandrite (a variety of chrysoberyl found in the Ural Mountains, and which looks green by day and reddish-blue by lamplight), and Toulon by a chrysoberyl,

Twenty-one other towns are represented by amethysts, thirty-five by tourmalines, and thirty-eight by quartz-crystals.

It can be easily imagined that a map whose towns were represented by precious stones should have something equally fine to mark the country's rivers. And the expectations will not be vain. All the river shown in this extraordinary map are represented in platinum sunk in the jasper. To effect this the courses of the rivers had first to be cut in the stone and the platinum laid in and polished. The whole effect is very beautiful indeed.

'And a pretty penny it must have cost!" the business-like Briton mentally exclaims. That the map cost a very large amount indeed is obvious. But the exact sum which came out of the Czar's exchequer to 'pay the piper' has never, of course, been made public property; nor is it likely that the information will ever be known in a general way. Estimates by experts on this point vary very greatly, ranging from £16,000 to £80,000. A well-known Parisian jeweller has explained the reason. All the stones and jewels came from the Imperial mines, and practically the only expense was the cutting, polishing and putting together. The stones only found in those mines (and appropriated by the Czar), never being found in commerce, consequently have no quoted value.

'In fact,' said the eminent jeweller referred to, 'it is probable that the map did not cost the Czar more than £16,000, if as much; but if a millionaire came to my shop and ordered one like it, I should have to charge him three or four times as much—if, indeed, I could make it at all.'

However, no matter whether the Czar expended £10,000 or 100 000 in its production, this map of France, with its precious stones and gold, is regarded by Russia's ally as one of its most priceless treasures.—*Strand Magazine* for May.

COLOURED GREEN TEA.

THE EDITOR, "INDIAN GARDENING AND PLANTING."

SIR,—If I am correct in inferring from your article and Mr Drummond Deane's letter in your issue of the 1st instant—"Coloured and Uncoloured Green Teas"—that a *true Green* tea, *not only* in "liquor," "infusion" and "flavour," but in *actual colour of "leaf" too,* is only produced by *artificial* means—or "facing"—I would point out that this is a mistake, as a very handsome "blue-green leaf" can be, and is, produced by *entirely natural, i.e., not artificially coloured* means; but, as Mr. Drummond Deane suggests, at an enhanced cost in "Panning." T.

—*Indian Gardening,* May 22.

THE BOTANY OF CEYLON.

25 PER CENT NEW SPECIES IN ONE HAUL.

We learn from a good source that the expedition to Hinidoon kanda, Sabaragamuwa, made last November by Mr Herbert Wright, the Scientific Assistant, Peradeniya, has proved most valuable. As we then stated, the primary object was that of determining our indigenous gutta-percha and ebony trees, but, in addition, a representative collection of all the plants growing on this hill was made. It has since transpired that the collection of plants forwarded to Dr. Levier, the Continental Cryptogamist, have proved to contain no less than 25 per cent of species new to science. This is interesting as pointing out what still remains to be done, though such renowned botanists as Gardiner, Thwaites and Trimen previously worked in the same district. The investigation of local floras should now become more important. Two of the new species have been named after the discoverer, Mr. Herbert Wright; viz.:—(1) Sematophyllum *Wrightii* and (2) Syrrhopodon *Wrightii.*

PRODUCE AND PLANTING.

Mr Ernest Tye gives some interesting figures relating to the area of

TEA UNDER CULTIVATION

in India and Ceylon at recent periods, together with the crops produced, based on official records. In 1890 there were 344,800 acres under cultivation in India and 250,000 acres in Ceylon, India producing 112 million lb of tea, and Ceylon 47 million lb, the total crop being 159 million. In 1895, with a cultivation in India of 415,700 acres and in Ceylon of 305,009 acres, the respective crops were 143 and 98 million lb, total 241 million lb. In 1900 the cultivation was in India 522,000, and in Ceylon 384,000 acres, producing 197 and 148 million lb of tea respectively, or a total of 345 million lb. The average annual increase in the Indian crop for the last ten years has been 8½ million lb, and in that of Ceylon 10 million lb. The home consumption for British-grown tea for the last calendar year—1901—was 238¾ million lb; the consumption in foreign markets and ship stores 95¾ million lb, making together 334½ million lb.

The crop of

FORMOSA TEA

is reported by the British Consul to have been last year of good average quality, and the foreign firms engaged in the traffic on the whole had a prosperous year. For many years Amoy was practically the sole market for the Formosa tea. This state of things has now changed, A discriminating duty of 60c per picul (133 1-31 lb.), the legality of which is disputed by the British merchants, exists in favour of the Kobé route, which is sometimes quicker for shipments by mail steamers to points on the Pacific Coast. Shipments by this route amounted this year to 70,000 half-chests, against 38,000 in 1900. But so long as freights across the Pacific are maintained at double the Suez Canal rate to New York, the bulk of the tea must go by the latter route, for which Amoy is the more convenient and better depot. In the year under review 75 per cent. of total shipments went *via* Suez. The Japanese Government are doing all in their power to divert the trade from Amoy to Kobé, and, if they can do so without protest, will no doubt increase the differential duty above alluded to.—*H and C Mail,* May 16.

AGRICULTURE IN THE PHILIPINES.

In a recent article on the Warfare of Commerce, we dwelt on some information, forecasting American ambition in connection with the newly acquired Archipelago, as set forth in its Philippine section by the *San Francisco Bulletin.* Our cousins across the Atlantic are too shrewd a race not to appreciate fully the value of their recent acquisition; and the Commission entrusted with the task, has reported at length on every subject connected with the administration of the Islands and their social, religious and industrial development. Under the heads of religion, education, laws, municipal Government, taxation, mining, forestry, agriculture, &c., we find practical and suggestive comments and recommendations, which are bound to bear fruit; and as we glance at these, the reflection is forced on us,—How much better if the capital, enterprise and energy of their new masters be turned to these channels, which can profit the Filipinos as well as the Americans very largely, instead of being devoted to devising huge monopolies for the enrichment of those already rich at the expense of the masses even in respect of the necessaries of life. Wiser counsels, however, may soon prevail, when the attitude of the Governments of the United States, as well as of the United Kingdom, is realised, towards the Trusts and Combinations which in their grasping selfishness, threaten to involve great States in serious complications; and when the Philippine Islands are reduced to a more loyal acceptance of the change of rulers, it may be that they will attract all they need in capital and energy for their progress in prosperity. And we shall not be wholly disinterested spectators: for while our own industries may be more or less affected by the development of similar ones in the Philippines, we shall also, doubtless, be able to learn not a little from what is being attempted and accomplished there, perhaps by methods differing from those with which we have long been familiar.

In Agriculture, probably, more than in any branch of industry, will this island be touched by what goes on in the Philippines—to learn as well as to teach, to put forth fresh efforts, as well as to reap the fruits of what has been sown. Hitherto,

the chief exports of the Philippines have been sugar, valued at 2½ million sterling thirteen years ago, hemp (£1,600,000) and tobacco (£500,000). We always understood that in coconuts the islands would be formidable competitors of ours; but we have not been able to trace any special mention of the palm industry in the pages which have come into our hands. On the subject of Agriculture, we read

The Philippine Islands are fundamentally an agricultural country. So much has already been said, and said truly, as to the great productivity of the soil and the diversity of climate within the archipelago that this subject may here be passed over. The methods of cultivation at present employed are of the crudest. Modern agricultural implements are practically unkown, Artificial fertilization of the soil is almost unheard of, and, as a rule, land is not deemed worth cultivation unless it will continue to produce crops indefinitely without enrichment.

There is a wide field for the introduction of new fruits, fodder grasses, grains, rubber and gutta producing trees. Grapes, strawberries, raspberries, blackberries, figs and walnuts have already been planted in Benguet, and are growing well. Tea has also been introduced with encouraging results.

Much of the agricultural land of the Philippines is admirably adapted to cultivation by steam plows and harrows. The water buffalo, which has suffered most heavily from rinderpest, has always been at best a slow and unsatisfactory draft animal. The American mule, on the other hand, thrives here.

And again

That the agricultural resources of the Philippine Islands are immense goes without saying. A country containing a vast area of fertile and undeveloped virgin soil where for years agriculture has been neglected and retarded by the constant state of war and insurrection that has existed for many years past; where no attempt has been made by the indolent natives to produce more than was needed for immediate consumption, and where modern implements and machinery and agricultural methods have been heretofore entirely unknown, the Philippine Islands stand today ready to receive the influx of capital, the farmer, and up-to-date implements and methods with which to develop its extensive resources: and this development will surely take place just as soon as the Government will make its policy, such that the settler and homesteader will have equal chance with the capitalist and moneyed syndicate and the public lands of the islands are thrown open to settlement.

Copra, tobacco. hemp and sugar are well-known exports, while the cultivation of rice has been so neglected that at the present time there is not enough of this product grown to supply the local market. Sugar, while being produced in large quantities, is grown and harvested with such lack of skill, and the syrup extracted by such antiquated methods that the output of simply the area now under cultivation could be increased 50 per cent or more by the introduction of intelligent cane culture together with modern machinery and appliances. The rubber and coffee trees and also many other minor branches of agriculture can be profitably engaged in and yield large returns.

But the Filipino is by no means inclined to work, and the labour difficulty is one that the investor must reckon with. And on this point the deliverance is more plain-spoken than encouraging:—

The greatest obstacle that confronts the investor in the Philippines is the labor question. It seems to be the general impression in the States that labor in the Philippine is "dirt cheap," a laborer being able to live on but a few cents a day and working for an extremely low wage. However, experience with the native laborer will soon destroy the illusion of cheapness. The price of an article alone does not determine cheapness—it depends upon what you get for your money. The average Filipino does not want to work; does not see the use of work, and is not going to work unless compelled to do so by pressing necessity. They can be divided into two classes; those who only work when necessity demands, and those who never work. They are much like the American Indian in the belief that women were made to work rather than men. The women are employed extensively in the cigar and cigarette factories and are good workers; they also occupy the markets in selling small products, and usually contribute the greater part of the support of the family.

The average day laborer receives a wage of from $8 to $12 gold per month, but a gang of twenty natives working together hardly accomplish as much as two or three good American workmen would do in a given space of time. They have no conception of the value of time or necessity. A large portion of their time is consumed in lighting and smoking cigarettes and in conversation with each other and a little work now and then just to fill in the time. Neither have they any idea of independent action, and must be told and shown every detail of what they are to do, and even then they seldom do it right the first time.

As to reliability, it is something entirely foreign to the Filipino. If he is told to do a thing he must be watched until it is completed or it will never be done. His veracity cannot be depended upon under any circumstances, as his last resort is the truth, and then only to be used in case of emergency.

Between "fiestas," church holidays and the indisposition of the "hombre" himself, twenty days' work in a month is a good average, and after each pay day or two he will have enough money on hand to tide him over for two or three weeks while he takes a vacation and visits his relatives.

Since writing the above review, the news has come to hand of President Roosevelt hinting at a restoration of independence to the Philippines later on. That prospect would be likely to discourage investment, unless such safeguards were taken as might ensure due protection for foreign capital; but in any case a guarantee of this kind most be one of the conditions.

OPENING OF THE EXPERIMENTAL STATION AT GANGAROOWA, PERADENIYA.

In the article on the history of the Botanic Gardens with which this volume opened, it was

mentioned on page 12 that the chief desideratum for a complete modern organisation of the Department was the opening of an experiment station or garden, where experiments could be tried on a large scale with staple products or with new products not yet staples. This station is now opened, the Government having purchased at the beginning of this year the almost historical estate of Gangaroowa, lying on the side of the river opposite to the Botanic Gardens. The estate is of 550 acres, and of approximately horse-shoe shape, forming the opposite bank of the Mahaweli-ganga up to the sky line all round the north, east, and west sides of the Botanic Gardens, while on the east side between the river and the hill there are about 200 acres of nearly level land with good soil. Visitors to the gardens will remember that many of the most beautiful views are obtained at places where the river curves, and that their beauty is due to the banks of the river itself and to the wooded hills behind. All these hills are included in the new experiment station, and are to be worked as forest reserves, so that there will be no interference with the scenic beauty of the neighbourhood. The experimental plots of economic plants will be laid out on the lower and more level land of the estate, which at present is mainly cultivated with cacao, pepper, coconuts, grass, arecas, and croton.

The estate is of historic interest in two ways. Round the bungalow enclosure may be seen the remains of the earthworks of the former Portuguese fort, the scene of a great defeat and slaughter of one of the armies which invaded Kandy. About 1824 the estate was opened in coffee, indigo, sugar, &c., by the then Governor, Sir Edward Barnes, who was one of the very first pioneers in the planting enterprise, which soon afterwards spread so rapidly over the central districts of the Island.—*Mr. Willis's Annals.*

THE NEW BRANCH GARDEN AT NUWARA ELIYA.

The Government having decided to open a small branch garden for experiments with cultivation of useful and ornamental plants in the peculiar soil of Nuwara Eliya, a small site of about 5 acres has been set apart for the purpose in the new park, and is now being brought into cultivation. It will be worked like the Badulla garden, as a branch of Hakgala. The land lies at an elevation of about 6,200 feet, and is at present mainly patana with scattered Rhododendrons and a small piece of swamp.—*Ibid.*

THE NEW RESTHOUSE AT PERADENIYA.

The building, mentioned on page 21 of the present volume as in progress, was opened to the public on 10 h March, and is very convenient for visitors to, and workers in, the gardens. It lies about 200 yards from the principal entrance to the Botanic Gardens, contains dining and sitting-rooms and four large bedrooms, and is fully furnished with all necessaries. Visitors working in the Peradeniya laboratories have a prior claim to some of the rooms, for which a charge of R1 per day is made. Meals are supplied according to arrangements to be made with the resthouse-keeper.—*Ibid.*

INDIA-RUBBER PLANTING.

It is becoming increasingly evident that for cultivation, at any rate in Central America and the adjacent territories, Castilloa elastica is much the most satisfactory tree for a variety of reasons. These are its rapid growth, its modest requirements as to quality of soil, its early maturity, its fine, smooth and branch-free trunk, and its large yield of latex.

It is true that, regarding the latter, the evidence available is so far contradictory to a degree, the annual yield of a full-grown tree being variously stated as amounting to from one to twelve pounds or more per annum. Thus we find Dr. Morris (The Colony of British Honduras, London, 1883) stating that the yield of a large tree of Castilloa two feet in diameter is about 16 lb of rubber when first cut, and that such trees at the end of eight or ten years may be reckoned to produce an annual yield of at least seven or eight pounds of rubber. But according to Senor Horta (Diplomatic and Consular Reports, No. 2,354 1899), an experienced planter, one pound per annum may be considered a fair average yield. This is in agreement with a recent statement made by the René Guerin (Journal d'Agriculture Tropical, 1902, p. 73), but all these data are opposed to Dr Warburg's assertion (Les Plantes à Caoutchou, trans. by Vilbouchevitch, Paris, 1902) that trees grown in favourable sites will produce an annual yield of 2·4 lb.

To reconcile such widely divergent statements made on the one part by planters of undoubted experience, on the other part by equally experienced botanists, is very difficult indeed. No doubt, to some extent, the explanation of this very wide discrepancy is to be found in the fact that the above data refer ot trees grown in different districts, on different soils, and at different elevations from the coast. It is well known that all rubber trees are very sensitive in this respect, and Castilloa not the least so. That conditions of this description exert a very important influence upon the yield is further evidenced by the fact that the conditions under which the Castilloa should be planted are just as differently stated. One authority strongly advocates its planting as a shade tree for cocoa and coffee, while another equally strongly deprecates this practice as utterly mistaken, insisting upon these trees themselves being grown in the shadow of other trees. Nor do we find any closer agreement between the methods adopted for tapping the trees, horizontal cuts, vertical cuts, V-cuts, or pricking being recommended. Each of these methods appears to have its adherents in different localities. The only point of agreement in this respect seems to be that circular cuts round the whole circumference of the tree unfailingly result in its destruction.

Equally diversified are the methods proposed for the coagulation of the latex when obtained. We find Biffen's centrifugal method strongly recommended, whilst others seem to consider the spontaneous coagulation of the latex on the trunk of the trees perfectly satisfactory, but the majority of writers appear to favour the coagulation of the latex by means of decoctions of various plants.

One begins to understand the causes and nature of the keen disappointments not unfrequently resulting from rubber-planting ventures in the past in running the gamut of these contradictory statements, and it is perfectly evident that, while the ultimate success of rubber planting on the large scale cannot reasonably be doubted, the whole subject is one requiring much more careful specialised study than it has so far received.—*India Rubber Trades' Journal*, May 12.

HOW TO TAKE QUININE IN MALARIA.

Major Ronald Ross, in the ninth edition of his book on "Malarial Fever" (2s 6d, Liverpool University Press), gives some useful notes on taking quinine. He explains that, as quinine is wanted in the blood, and not in the stomach, the best form is to take it dissolved by means of acid. The next best form is that of the powder shaken up in water. Quinine pills, tablet forms, or capsules takes longer before it is absorbed into the blood, and, if pills or tablets are used, they should

be previously immersed in water for a few minutes so as to disintegrate them. The bitter taste of suspended or dissolved quinine can be corrected by taking one or two mouthfuls of food immediately after the medicine. Just before meals, especially before breakfast, is the best time for quinine, and its presence in the blood should be announced by a ringing in the ears within half an hour. Details of the doses needed in malarial fever are given—for a first attack 10 gr. of quinine should be given about every twelve hours for a week, which may be increased to 15 or 20 gr. In cases of vomiting it may be necessary to reduce the dose, and it is often useful to administer a saline purgative with the first dose of quinine. If a person has once become infected with malarial fever, he must continue to take quinine regularly for at least three or four months, so as to ensure extermination of the parasites, otherwise relapses are sure to occur.—*Chemist and Druggist*, May 17.

TROUT OVA.

It will be interesting to our readers to learn that of the first consignment of 20,000 brown trout ova, which arrived a few months ago from the Wyresdale hatcheries about 12,000 were hatched out successfully. At a Committee meeting of the Fishing Club recently held, it was decided to distribute the fry out to the different streams as follows—and which has since been done:—

Belihul Oya	...	...	500
Ambewella	...	...	1,000
Horton Plains	...	...	3,000
Nuwara Eliya Streams		...	1,500
Barrack Plains	...	...	300
Maskeliya..	...	...	500
Mr. R Jackson, for Sita Eliya		...	200

The other fry are at present in the stew pond. Of the first consignment of 20,000 rainbow trout ova from the Earl of Denbigh's hatcheries only 2,500 are reported to have hatched out and within the last fortnight these have begun to die to the extent of 40 to 50 a day. Of the second consignment of 20,000 rainbow ova also from the Earl of Denbigh's hatcheries 50 fry only hatched out. There were also 5,000 brown trout ova sent out as a present. Of these only 200 are said to have hatched. The fry of this consignment and also that of the first consignment of brown trout ova are also dying daily but in smaller numbers.—*Cor.*

VACCINATING OYSTER TO PRODUCE PEARLS.

Pearls are found to be due to the presence of a larva, which is an intestinal parasite of the eider duck, and has also been found in the scoter or black duck. The larva, parasitic in the mussel, is found to arise as a tailless creature, which enters the tissues under the skin of the mussel, and becomes surrounded with a sac similar in character to the outer shell-secreting skin of the mantle. If the intruder dies in the sac, it becomes calcified and forms the nucleus of a pearl, the pearl arising, like the shell itself, from the line of the cell wall The parasite sometimes migrates out of the sac, in which case the nucleus of the pearl is inconspicuous. The complicated life-history of the parasite, and absence of organs of locomotion suffice, in the opinion of the *British Medical Journal*, to account for the hitherto inexplicable distribution of pearl-bearing mussels. By experiment it has been found that pearls are caused by similar parasites in some of the pearl oysters; and it is believed that artificial infection of pearl oysters could be effected in a manner similar to that which has been found successful in the case of the common mussel.—*Bombay Gazette*, June 3.

SOUTH AMERICAN RUBBER INTEREST

(From *India Rubber World*, May 1,)

Arrivals of rubber at Manaos during the first three months of 1902, from the different rivers in the state of Amazonas, were as follows:—

Purus	...	... *kilos*	4,424,837
Jarua	...	...	1,840,747
Solimoes	...	...	729,446
Madeira	...	...	1,010,482
Various streams		...	239,290
Total	...	*kilos*	8,244,803
Total, same months, 1901		...	6,991,286
Total, same months, 1900		...	7,779,985

A correspondent at Manaos wrote recently that many persons there were hoping for an advance in prices, and were for that reason holding back rubber. Business was depressed, and the large houses were not disposed to sell goods except on strictly cash terms. The inspector of the treasury, Colonel Felippe Minhos, and Dr Portirio Nogueiro, secretary to the governor, had gone to the United States to try to negotiate a loan of $1,000,000, in return for which, it was rumoured, the lender would have very desirable concessions in respect to export duties on rubber. A law had been introduced in the congress at Manaos to substitute a fixed duty of two or three milreis per kilo for the existing *ad valorem* rate of 22 per cent

The *South American Journal* (London, April 12) contained advices from Para, stating:—"A most important move in the rubber business is about to be made by a Peruvian. named Spinoza, who arrived here a few days ago from Iquitos, bringing with him 70 workmen who understand working Caucho." The idea appears to be that, on account of the exhaustion of extensive Caucho fields in Peru, increased attention is being given to Caucho in Brazil, where the preparation of the gum is not understood, while the Peruvians are expert in it. It is reported to be probable that on the Tocantina and other large rivers in the state of Para "large quantities of Caucho will be found, and now that a commencement is about to be made, the result will probably be an immense increase in the production of Caucho in the next few years."

ESSENTIAL OILS. OF INTEREST TO CEYLON.

(From Semi-Annual Report of Schimmel & Co. (Fritzsche Brothers) Miltitz near Leipzig, London and New York.—April 1902.)

CAMPHOR OIL.

It is, of course, well-known that the production of camphor in Formosa has been monopolised

by the Japanese Government, and that the monopoly for this kind of camphor has been transferred to an English firm. But the production of camphor in Japan remained as before in the hands of private firms, and it was only natural that the valne of the article could not always be kept at the level of the prices fixed by the monopolists but ocoasionally moved backwards.

Under these conditions the Japanese Government was compelled to consider the question of also monopolising the camphor production of Japan. A bill to that effect has been brought before Parliament but, we are informed, has not been passed.

The Formosa Government will probably sooner or later take over the whole of the Japanese camphor and work it jointly with the Formosa camphor, so that the production of both countries will be under one single control. It remains to be seen whether the further exploitation in such case will also be granted to a private firm. Only when the whole world's production of camphor is controlled by one hand will it be possible to keep up tho value.

CINNAMON OIL, CEYLON.

In the course of the last few months the prices of fine Ceylon cinnamon chips have suffered a decline, which enabled us already in January to reduce our quotation of the well-known fine sweet and heavy oil. They have never before been so low as at this moment.

CITRONELLA OIL (CEYLON).

The fluctuations, which the value of this important article has undergone during the last six months, are so trifling that they may bo left out of account. The sensational reports, which regularly make their appearance at certain periods, that at the low quotations the distillation no longer pays; and is slowly becoming extinct, are refuted by the fact that the export again shows an increase as compared with that of the previous year. There can be little doubt that, with a selling price of about 2/- per kilo, the manufacture of citronella oil is not very remunerative, more particularly as the present state of the knowledge of the article renders the profitable adulteration of the oil, which nsed to be the order of the day, an extremely difficult matter. At the same time, the unfair trading in this article has not yet been completely done away with, for samples are constantly being submitted for our opinion, which do not answer the conditions specified by us. In view of the unexampled cutting which prevails in citronella oil, the greatest care is required in purchasing.

We have obtained extraordinary results with the Java citronella oil specially distilled for us. This product shows clearly what can be obtained by rational, expert cultivation and distillation of the crude material, for the species of plant nsed in Java is the same as in Ceylon. And yet what a vast difference between these two oils!

It affords us great pleasure to be able to present to our readers on the next page a picture showing part of the plantation on which this oil is produced. In the foreground is seen a field planted with citronella grass. The building on the left contains the apparatus used for distilling the oil. In view of the interminable tronble and care caused by undertakings of this character in such far-off countries, it is sincerely hoped that the excellent product may constantly increase in favour, and may meet with the appreciation to which it is justly entitled, so that the manufacture may be continued on a large scale. If produced on a small scale, the expenses are proportionately too high.

We shall be pleased to supply samples.

CLOVE OIL.

According to the official reports from the German Consulate at Zanzibar, the clove harvest extends over the whole year, commencing in the beginning of July and lasting until the end of June. This report states further:—From 1st July, 1900 to 30th June 1901, 250,000 frazileh have been brought to the market. An average crop was formerly estimated at 375,000 frazileh, but should now, no doubt, be taken at a lower figure, as the trees have been neglected through lack of labour. The prospects of the 1901-1902 harvest are said to be good; it is hoped that the yield wi l be 400,000 frazileh, or 14,000,000 lb.

The export was:—

	lb.	Value in Rupees.
in 1898 ..	10,856,566	2.155,956
„ 1899 ..	16,593,340	2,958,487
„ 1900 ...	11,788,095	2,372,227

It was divided as follows:

	1898	1899	1900
	Quantities in lb.		
Europe ..	4,138,086	8,028,780	5,235,388
America ...	729.960	648,970	719,600
Asia ...	5,912,800	7,599,517	5,769,293
Africa ...	75,720	316,073	63,814
	Value in Rupees		
Enrope ..	797,375	1,394,217	1,031,952
America ..	149,402	110,108	150,079
Asia ...	1,194,032	1,397,837	1,177,754
Africa ...	15,147	56,425	12,442

The export to America was exclusively to New York; that to Asia, to Bombay, of which perhaps a part has been re-shipped to Europe.

The export to the various European ports was made up as follows:—

	1899	1900	1899	1900
	lbs.		Rupees	
Rotterdam ..	4,473,240	2,674,160	786,212	537,810
London ..	1,432,475	1,404,968	254,852	274,520
Hamburg ..	1,249,850	715,260	204,267	122,912
Marseilles ..	292,215	217,000	51,229	49,800

To Rotterdam's share should be added 84,000 lb. valne 18,000 Rupees, shipped to that port via Amsterdam.

Clove stems were exported:

	Quantities in lbs.			Value in Rupees.		
	1898	1899	1900	1898	1899	1900
To Europe:—	534,640	3,605,245	1,743,426	24,055	104,351	70,453
To Asia:—	305,561	216,483	220,447	14,845	6,748	11,621
To America:—	336,875	555,940	98,000	19,657	31,708	7,700

Whilst in the previous year the export to America was more than double that to Asia, the former has now beoome quite unimportant. It is shipped to New York and Bombay. In Europe, Hamburg takes the first place:

	1898	1899	1900
	Quantities in lbs.		
Hamburg ..	456,890	2,980,110	1,478,226
London ...	74,900	370335	83,160
Marseilles ..	38,850	179,900	28,000

But in clove stems also Rotterdam enters strongly into competition. The import amounted in 1900 already to 112,000 lb, to which should still be added 42,000 lb from Amsterdam.

The reports emanating from Holland are in some respects in direct contradiction to the official consular reports; in others their calculations, or rather estimates, anticipate events in such a fantastic manner as to astonish every thoughtful reader. In the statistics of one of these reports, dated January of this year, the estimates made include not only the yield of the harvest 1902 to 1903 (*i.e.* commencing in July 1902 and ending in June 1903), estimated at 3,000,000 kilos, but also the consumption from 1st September 1902 to 31st August

1903 (5,400,000 kilos) and even the stock in September-October 1903 (2,420,000 kilos)! And as the stocks on 1st January 1902, at all the principal markets, amounted in the aggregate to 137,000 bales or 8,220,000 kilos, the anticipated reduction of the stocks by September-October 1903, by 5,800,000 kilos, is used as an argument for an increase in the prices of cloves!

MUTILATED SEEDLINGS.

"Knowledge" has an intresting account of the behaviour of seedlings when mutilated by the removal of the plumules. "Seedlings of various plants were experimented on, including some of the garden radish. On removing the plumule soon after the plants were above the ground, it was observed first that the cotyledons assumed a much deeper green than usual; then the petioles developed extraordinarily, becoming three inches long, while the cotyledons attained a breadth of an inch and a half and nearly double the thickness of those of a normal plant. It was also observed that they were raised at an angle of about 45° instead of being approximately horizontal. A microscopic examination showed that the greater thickness of the cotyledons was due to the increased size of the cells and not to a multiplication of the layers. The roots developed to nearly the ordinary market size. In seedlings of the common sunflower, treated in the same manner, a remarkable elongation of the hypocotyl was noticed, this becoming twice as long as in the unmutilated plants."—*Knowledge* for May.

WEST INDIAN SWEET POTATOES.

Owing to the possibility of profitable cultivation of sweet potatoes, considerable attention has been given to the potato crop by the Imperial Department of Agriculture for the West Indies, and a great deal of experimental work has been carried on. Experiments were made in Antigua with a view to determining the best varieties for cultivation. Fifteen varieties were planted and the crop from each weighed; the yield varied from ·6 to 4·4 tons, the varieties 'Eliza,' 'T.1,' and 'T.2,' giving the largest crops. A full report of these experiments will be found in the *Report on certain Economic Experiments in connection with the Botanic station, Antigua, 1900-1901*. In Barbados alone starches, grains, and meals, which are food-stuffs similar in compositon to sweet potatoes, are imported to the value of £95,000 per annum, so that, if the potato crop could be preserved for consumption during the year, it could be used instead of this imported food. Sweet potatoes will not keep without some desiccating treatment in the West Indies, the conditions for their preservation being storage in dry air at about 50 deg. to 60 deg. Fahrenheit. In Japan they are preserved by cutting them into slices and drying the latter in the sun. Many tons of potato meal were made by Mr Spooner, of Antigua, who prepared it by slicing the potatoes in a chaff-cutter, and drying the slices in the sun while spread out on wire netting, the drying being complete in about eight hours,

One ton of potatoes by this method yields 910 lb of meal, at a cost of about £4 10s 0d per ton of meal.

Dr. Voelcker, who analysed the product, found it had the following composition:—

Moisture ...	... 11·99	per cent.
Nitrogenous matter	... 5·12	do
Oil.	... 1·19	do
Sugar	... 9·90	do
Starch and carbohydrates	... 67·01	do
Woody fibre ...	... 1·89	do
Mineral matter ...	... 2·90	do

As regard the keeping qualities of the meal, some of it was stored in tins for twelve months, and was then found to be perfectly good.

A large portion of the sweet potato crop is at present used for making spirit, which is shipped to Portugal and used for fortifying wines.—*Home paper*.

PLANTING NOTES.

WHITE ANTS AND COCONUTS.—Writing to us from Pemba, Zanzibar, Mr. Theodore Burtt of the "Friends' Mission" says:—"In regard to the destruction of young coconuts, by white ants, some time ago I tried watering them with sea water. This had a most beneficial effect, but, of course, it can only be done when the plants are near the shore. The ants do not trouble to eat the husks, they eat out the central shoot of the growing palm and then it dies."

RUBBER PLANTING.—The various plantation companies organised in the United States for operations in Mexico, with rubber as the principal or an important feature, appear, says *the India Rubber World*, May 1st, on the whole to have made steady progress during the past year. No company which has once made a definite beginning has withdrawn from the field, while new companies are being organised all the while. Much preliminary development work has been done, a considerable amount of rubber has been planted, and a great number of rubber nurseries are in existence or are being planned for the coming season. The managers of the several companies appear to feel encouraged as to the result of their work thus far, and there has been developed nowhere any reason for fear that, in the end, rubber cannot be cultivated profitably under right conditions and right management, even if some of the many eneterprises, under weigh should result in failure.

THE CRY OF "COARSE PLUCKING."—We hope this cry is not going to be overdone at home, because we see in it one of the levers used by the dealers there to work a reduction in the price of tea. Favourable weather for flushing has just now made planters in many districts very busy, and from many quarters we hear of a rush of leaf. Stores, as a Pussellawa resident wrote a day or two back, are "chock-a-block," and it is incorrect and unfair to attribute rushes of crop, which run up the poundage figures, to a return by planters to coarse plucking. Local "Times."

FOR A NEW PRODUCT.—Application to Government for a grant of land.—We learn that a visitor, Mr. Ervert, who has been in the island some months, has applied to Government for a large block of land in the North-Central Province, on favourable terms, for the cultivation of new products, viz. aloes and hemp. The Government has asked for particulars and in the meanwhile the applicant is prospecting for a suitable block of land for the cultivation of the fibre plants. Mr. H P C Armitage, Assistant Conservator of Forests, it is said, has been asked to lend the prospector any assistance that might be required. The land applied for is in the North-West portion of the Province, which has a fine soil suitable for aloe cultivation. Nothing has yet been settled, the matter being only in an initiatory stage, and the Government has not yet received particulars from the prospector.

RUBBER IN CUBA.—Writing in *The Independent* on "The Future of Cuba," the president elect of that republic, Senor Tomas Estrada Palma, says: "As for rubber, there are some Caoutchouc trees growing in Cuba, chiefly on soil that has no other use. But in the province of Havana Cubans are already establishing nurseries of young trees, and the people are buying them extensively."—*The India Rubber World*, May 1.

TOBACCO-GROWING UNDER TENTS.—It is stated by the "Implement Age," of Philadelphia that growing tobacco under tents is now being carried on in Connecticut. Experiments were made in 1900 and 1901 by the State agricultural station and by individual growers in the effort to raise wrapper-leaf tobacco of the Sumatra type in fields completely covered and closed in on all sides with thin cheese cloth. The results were so gratifying that it seems likely the methods of tobacco culture in that State will be revolutionised.—*Globe*, May 10.

QUEENSLAND COFFEE SEED.—Mr H McLeod Playfair, of Mudigere, has received a parcel of coffee seed from Cairns, North Queensland, and appears to have avoided the risk of introducing leaf-disease. Seeds put down in January have yielded exceptionally sturdy and healthy plants, and as the seed is offered for sale a good number of coffee-planters will probably desire to make a trial of it. We have writtten so often about the desirability of introducing new and healthy strains that we have really nothing fresh to say on the subject. Our own belief is that, if care be exercised in the selection, the introduction of such strains provides a check upon disease instead of helping to spread it.—*Planting Opinion*, May 31.

TWO MORE TEA COMPANIES.—The Hunasgiriya Company has fallen on evil days and unless there is an improvement in prices, or a full maintenance of the better rates now being realised, it may be necessary to circumcribe the area under tea and concentrate attention on the very best fields. In the olden days, Hunasgiriya was quite a show-place under coffee; but much was taken out of the soil in those years.—The Eastern Produce and Estates Company has had a striking career since it took over the affairs of the old Ceylon Company, Limited, and the full report of the annual meeting which we publish elsewhere makes interesting reading. Commencing with a burden of no less than £193.000 in Debentures, by good careful management and the profits from tea in the early days, this debt has been reduced to £72,500 and the whole capital of the Company is now only equal to £30 a cultivated acre, without counting valuable property in mills, &c. in Colombo. The Directors thoroughly believe in fine plucking and are going to adhere to it. The Company makes a profit —apart from attention to its own estates—through its engineering and agency work; and having plantations at all elevations and in a great variety of districts, the shareholders must be content with a fair average price for its tea and not expect the prices appertaining to the high estates of a Company that has no medium nor low country properties. Mr, R. A. Cameron, Mr. Norman Grieve and the other Directors may well be satisfied with the outcome of their labours, following on the good work done by their staff in Ceylon.

THE PRODUCTION OF CACAO IN AFRICA.—A West Indian merchant writes to *The Times* to say that in a few years' time Africa seems likely to prove a formidable rival to South America and the West Indies as a producer and exporter of cacao and those interested in the West Indian possessions of the United Kingdom and anxious to see the island more prosperous will do well to watch how the cultivation of cacao is being pushed on with satisfactory results throughout the continent of Africa. This year the German colony of the Cameroons, hopes to ship three thousand bags of cacao, to be increased, it is estimated, to ten thousand bags in 1906. Our correspondent adds:—'Mr McClounie, head of the scientific department of British Central Africa, reports the successful shipments from Kew and receipts at Lomba of 210 plants which had been planted out and were doing well. Lagos is also going in for cacao, and one of her planters is now travelling in the West Indies to see how the estates are managed in Trinidad and Grenada.' He also says that the little Portuguese island of St. Thomè has greatly increased its export of cacao in ten years, the shipments in 1891 being under four thousand tons, whilst last year very nearly sixteen thousand tons of cacao were exported.—*Agricultural News*, April 25.

METALLURGY AND ENGINEERING.—The tenth "James Forrest" lecture was delivered on Wednesday night at a special meeting of the Institution of Civil Engineers by Sir William Roberts-Austen, whose subject was the 'Relation between Metallurgy and Engineering.' As to the use of cast iron and malleable iron, he said it was admitted that the necessity for pumping water out of mines was the main factor in the evolution of the steam engine, and in turn the development of British metallurgy of iron and steel dated from the time when Watt's steam engine enabled air readily to be pumped into the blast furnace employed for the production of cast iron. More than half of last century had elapsed before the age of steel began, and towards the end of that century great attention was devoted to considerations connected with the molecular structure and properties of steel. When metallurgists gave engineers mild steel they provided a cinder-free solid solution of iron and carbon. All subsequent advance had been due to the recognition of this fact, and to the study of the properties of metallic solid solutions. Sir John Hawkshaw in his presidential address to the Institution delivered in 1862, said that if the strength of iron could be doubted the advantages might be equal to the discovery of a new metal more valuable than iron had ever been. This was exactly what metallurgists had done with regard to steel by suitable thermal treatment and by suitable additions of comparatively rare metals. The lecturer next explained the nature of solid solutions, and dwelt on the importance of allotropic modifications of iron. Some very beautiful experiments were shown in evidence of the possibility of the past molecular history of a mass of steel being traced by microscopic examination of the solid metal, which might even reveal by its structure the vibrations to which it had been subjected. Finally, in regard to the efforts metallurgists were making to study the influence of rare metals on iron and other metals, the reducing power of aluminium on metallic oxides was exhibited, very high temperatures of 3,000 deg. C and over being produced. A vote of thanks to the lecturer was proposed by the president, Mr C Hawksley, and seconded by Sir Frederick Bramwell.—London *Times*, April 25.

TAHITI VANILIA.

In the May number of *Chambers' Journal*, Mr A McFarlane of Moorea, Society Islands, contributes an interesting article on vanilla-growing in Tahiti, after reading which one is tempted to sigh for the life of a vanilla-planter. Tahiti, he says, has the finest tropical climate in the world—no hurricanes, no malaria or fevers—and a friendly race of natives to live among. A man with three or four acres of vanilla has a competence; with ten or more he is rich, and for one who likes to "potter" around among flowers there is no life more attractive, says Mr McFarlane. So much has been written about vanilla planting and curing that Mr McFarlane's article necessarily traverses old ground, but he gives several interesting facts in describing the methods employed in the South Sea Islands. Although Tahiti is one of the largest vanilla-producing countries, yielding annually nearly one hundred tons of pods, the product is the worst vanilla that reaches the European market. This is mainly due to the native planter who does not give the necessary attention to the curing, which is the most important work. There is no secret about the method of curing, although some pretend that there is. It consists in alternate exposures to the sun, always under dark-coloured blankets, and sweating in the house in light tins or boxes. The average price of Tahiti vanilla is six shillings per pound, and as Mr McFarlane, who is a cultivator and curer of vanilla, estimates that it costs two shilling per pound to grow and cure, a good margin of profit is left for the grower. Most vanilla-planters suffer from small itching blisters on the hands, resembling "prickly heat," which is brought about by the constant handling of the beans, Mr McFarlane has found a specific in his own case, and that is a mixture of equal parts of carbolic acid, glycerine and rosewater, rubbed on the hand—rather strong in carbolic, we think; perhaps he means carbolic lotion.—*Chemist and Druggist*, May 17.

INDIAN TEA ASSOCIATION,

Calcutta, 20th May 1902.

THE GREEN TEA BOUNTY, 1902.—With their letter of 2nd May, the London Committee forwarded copies of correspondence which had passed between the Baraoora (Sylhet) Tea Co. Ld. and themselves on the subject of the Green Tea Bounty for the ensuing season. The correspondence explained the circumstances which had led the London Committee to accept the proposal of the Baraoora Company to make 200,000 lb this year and to allow from 25 to 30 per cent of the amount to be sold on the Continental markets. The correspondence had been placed before the Green Tea Sub-Committee for consideration, in connection with the preparation of the circular for issue to the members of the Association, detailing the conditions under which the bounty would be payable during the ensuing season.

Recorded letter of 14th May, from the Secretary of the Liners' Conference, Calcutta, acknowledging receipt of the Committee's letter on the subject of the establishment of communications with the

BLACK SEA

ports with the view of fostering the Indian Tea trade with Russia. It was stated that the matter was being placed before the various owners and that it was hoped that some arrangement would be arrived at whereby the Indian Tea Trade with Russia might be helped.

6

Considered, a Memorandum by Mr.

HAROLD MANN,

Scientific officer of the Association, reviewing the position since the institution of the Scientific Department two years ago, and suggesting for consideration in view of the fact that his agreement would expire in another twelve months, certain proposals for future procedure in the event of a continuance of his engagement being decided upon. Mr Mann drew attention to the many problems connected with tea culture and manufacture, awaiting full investigation, and dwelt upon the practical impossibility of his being able to deal with them satisfactorily, single-handed. His first suggestion, therefore, was that an Assistant should be engaged from England, who should be capable of taking up more especially the manufacturing problems and working them out under Mr Mann's supervision. Another important advantage to be kept in view was that by the engagement of such an assistant the continuance of operations would be assured, in case of a breakdown in health of either Officer. Mr Mann's proposals also embraced the establishment of a central laboratory, the engagement of a trained Babu to work out analyses of soils, etc., and the provision of a small experimental station in the Tea Districts where observations could be made of the properties and results of various fertilising agents, such as phosphates. Altogether, Mr Mann estimated the increased cost of the establishment of the complete scheme at R12,000 per annum. Accompanying the Memorandum was a Note by the Chairman dealing with the financial aspect of the proposals. The Association, he pointed out, was at present contributing about R5,000 a year towards the present expenditure, which amounted to about R15,000 per annum, but it could not find more without trenching on its reserves. The question thus arose as to how the extra R12,000 required was to be found.

The papers had been previously circulated, and a lengthy discussion now ensued as to the practicability of the scheme. The consensus of opinion was in favour of carrying on the investigations, as much good had undoubtedly resulted from Mr Mann's work hitherto. It was finally decided in the first place to publish Mr Mann's scheme with a covering circular letter to the various local Associations and to the London Committee, stating that the Committee were generally in favour of the views therein expressed, provided that funds could be found to carry out the proposals. The financial position of the Association was to be pointed out and the local Associations asked for an expression of their views, particularly as to their willingness to increase their subscriptions to the Scientific Investigation Fund. Reference to the Governments of India, Bengal and Assam, which would be necessary ultimately, was to be deferred pending an expression of opinion from the representatives of the Industry.

It was decided, after discussion, to forward a copy of the statement to Messrs Andrew Yule & Co., the Commissioners for the Indian

TEA MARKETS EXPANSION

Commission, and to inform them that the Managing Agents, Messrs. Kilburn & Co., would be ready to assist as far as possible any efforts which might be made to stop refuse tea going into consumption.

The Secretary reported that the new signatures to the Compulsory

TEA CESS

Memorial brought the area up to 412,236 acres, or approximately 79 per cent of the total area under tea cultivation. The area reported on 23rd April amounted to 409,006 acres.

THE BANANA.

A fruit that has never yet come properly into its own is the banana. Such, at least, is the opinion of vegetarians, not a few of whom justify the faith that is in them by living altogether on banana products; and even less heroic martyrs are beginning to think that the banana will prove the most persuasive weapon of conversion in the vegetarian armoury. Already there has appeared in the Midlands an enthusiast, just fresh from South America, with an unheard-of collection of banana recipes; and if all goes well with the propaganda, we may expect to be taking within a few years for breakfast plain bananas, banana pancakes, banana muffins, and banana coffee; for lunch, banana fritters, banana bread, banana biscuits, and banana cake; and for dinner, banana wafers, banana figs, and a small cup of banana coffee. Apropos of bananas, there is a costers' club in a quiet street off the Edgware-road which was formerly devoted to innocent recreation. But the spirit of utilitarianism has prevailed over the desire for social enjoyment, and the premises have now become a forcing-house for West Indian bananas. The bananas are consigned direct to the club, thus saving the middlemen's profits, and every room is filled with great bunches of the fruit, ripening under gentle heat for the public palate. The members of the club can select their own bunches and pay for them as they sell them, so that an initial capital is not required. On a good day, with a cartload of these bananas, a coster can clear a nett profit of—but perhaps it will be more discreet to keep the figures dark. The coster's, like all other callings, already suffers from overcrowding.—*Daily Chronicle*, May 16.

VANILLA GROWING.

BY A M'FARLANE, OF MOOREA, SOCIETY ISLANDS.

I have been for years a cultivator and curer of vanilla.

The white planter in the tropics, after he has been for some years subjected to the enervating effects of the climate, becomes averse to anything in the shape of labour more than is absolutely necessary for conducting whatever particular avocation his may be. So that the residents of a Northern clime have to depend upon the kind services of the 'globe-trotters' for their information upon the various cultures; and, owing partly to the short time which they are enabled to devote to acquiring information, and often-to misleading statements made by planters intentionally, sometimes this information is very incorrect. This stricture, however, does not refer to the article by Mr Cater, and I must compliment him upon the care which he has evidently displayed in his study of the vanilla. He has, however, made a few mistakes; and I thought it might perhaps interest your readers, were I to correct them and also describe the methods employed by us here in the South Sea Islands.

Although Tahiti is one of the largest vanilla-producing countries, ranking second or third, annually yielding nearly one hundred tons of the dried product, ours is nearly the worst vanilla that reaches the European markets, commanding only about half the price which is paid for vanilla produced in Reunion or Seychelles, or one-quarter of that paid for the best Mexican. However, to offset this advantage, we have the advantage of the finest tropical climate in the world—no hurricanes (Tahiti being outside of the 'hurricane belt,' which only reaches the Raratonga or Cook Islands, six hundred miles to the west), no malaria or fevers, no poisonous serpent, and but few noxious insects—and have a gentle, friendly race of natives to live among.

We, have here in cultivation two varieties of vanilla: *V. planifolia*, grown only in very limited quantities, as, owing to the tendency of the bean to split when nearing maturity upon the vine, and afterwards during the process of curing, it does not appeal to the native grower, and the variety in common cultivation, which is that known in Mexico as *pompona*. Both varieties were originally brought here from Mexico. *V. planifolia* produces the true vanilla, while *pompona* yields what is known in Mexico as *vanillon* and in the London market as *vanillos*. *V. pompona*, although yielding such an inferior quality of fruit, has advantages which endear it to the Tahitian. The bean does not split; it can be cured by simply exposing it to the sun, not requiring to be dipped in hot water or subjected to a process of baking, as do the others; and it always gives two and sometimes three or four crops of flowers during the year, while *planifolia* gives but one and that of short duration.

Most of the Tahiti vanilla is planted so as to climb upon the guava, which is about the worst tree that could possibly be obtained for the purpose as; the bark constantly peeling off causes the tendrils of the vanilla to lose their hold with it, and the vines have to be hung over any convenient branch to keep them from falling to the ground. The guava is an imported tree, but it has taken possession of large tracts of land; and to make a vanilla plantation requires the minimum of labour, usually only the cutting out of a few guavas where they may be growing too thickly, and the planting of vanilla-vines at the roots of the remaining ones. Upon hillsides where the *purao* (a species of Broussonetia) grows, the vanilla is at home. In fact, it is a mistake to plant it upon level land, as, although the vine revels in moisture, the roots are very impatient of water lying stagnant about them. The *purao* is, however, a rapid-growing tree, and considerable labour is required in pruning in order to keep it within bounds and prevent it from overshading the vanilla, too much shade being even worse than too little.

The best situation for a vanilla plantation is on a hillside, perferably in a valley, not too near the sea; and the best system of planting, for one who can afford to wait, is to clear off all the trees which may be growing upon it, and to plant at regular intervals young trees or posts, of varieties which will grow from cuttings. In my experience the best is a small tree known locally as *pini*, a species of Bauhinia, and which will grow in two years to a height of from twelve to fifteen feet. The usual distance apart for the posts is six by eight feet. When these posts are in place, the vines are planted as Mr Cater says; only that we usually use cuttings of ten or twelve feet in length. When cuttings of this length are used a crop of beans is secured nine months or a year sooner than when short lengths are planted. We reckon on a small crop of cured beans eighteen months after planting, and a full crop in two years and a half.

The flowers, which last but one day, open about 7 a.m. and close about 3 p.m., and have to be pollinated by hand during that time—that is, all those which open upon one day must be pollinated the same day. We use small, pointed sticks for this purpose; the pollen, which is a small compact mass, being transferred more rapidly by these than by any other method that has been tried. A very expert worker can pollinate three thousand flowers in one day, but most are satisfied with from fifteen hundred to two thousand.

About nine months after the flowers appear, the beans become mature. This stage is known by their changing in colour from a dark to a light-yellowish green, or by their becoming brown at the lower or flower end, when they must be picked and taken to the house to undergo the process of curing, which should occupy about three months. They can be cured in a shorter time, but always at a sacrifice of quality. This is the most important work of the vanilla-planter and entails constant care, as a few days' neglect may spoil the whole crop. This, I think, partly explains why Tahiti vanilla has such a bad name in the markets of the world. Most of the native planters cure their own crop, but they will not give the necessary attention to this work. There is no secret about the method of curing, although some pretend that there is. It consist in alternate exposures to the sun, always un-

der dark-coloured blankets, and sweating in the house in tight tins or boxes. Experience is the only teacher as to when the bean has arrived at the proper stage of dryness.

I have to differ from Mr Carter regarding a few of his statements. For one thing, the vanilla is essentially a terrestrial orchid, and derives a large part of its sustenance from the soil. In proof of this, in any old, neglected plantations plants may be found which have been uprooted or broken off. When this happens, the part of the vine which is left at once takes on a sickly yellow hue and sends down long roots—I have seen some of these over thirty feet long—which on reaching the soil take root, and the vine at once recovers. The small tendrills do not feed upon the trees to which they cling, these being simply used as anchors for the vine. This refers to live trees; when the tendrils come upon a decayed branch, or when the tree upon which the vanilla is trained dies, they then change their character, becoming elongated and entering into the decayed places as proper roots, and evidently feed upon it.

In his estimate of the possible crop and probable profit I cannot agree with Mr Carter. First, an estimate of four beans to a vine is ridiculously small. If a vine has only one bunch of flowers, that ought to give from eight to twenty flowers—we usually have eight to ten beans to a bunch; but it is a very poor vine which does not give in the year over ten bunches of flowers. However, to be safely within the mark, let us say that each vine averages five bunches of flowers, giving six beans to the bunch, or thirty beans to the vine. This will give three thousand beans to the hundred vines. Taking these at a hundred and fifty beans to the pound, the usual average, we have twenty pounds as the crop. This at our average price of six shillings gives six pounds sterling, or at the price mentioned by him—twenty shillings—twenty pounds. Where he is wrong is in the weight. One thousand beans—and they must be the best—will weigh fifty pounds, but only when they are green; and in the process of curing they lose at least three-quarters of their weight. Figures, however, are sometimes misleading, and I cannot do better than give as an example the result from a small plantation in which I am interested. A careful account of the expenditure and receipt has been kept. At the end of three years and a half from the time of planting the vines we have paid back all that has been expended upon them, and have a small balance in hand. A man here with three or four acres of vanilla has a competence; with ten or more he is rich; and for one who likes to potter around among flowers in the temperature of a greenhouse I cannot imagine a life more attractive.

By the way, although the fruit of the vanilla is in no sense a bean, it is invariably called by that name.

Our vanilla is one of the most speculative crops, rivalling hops in that respect. I have known it to sell for two shillings a pound—that was ten years ago and it has never gone below four shillings since and again for sixteen shillings. The average price, however, is six shillings; and, as we estimate that it costs two shillings per pound to grow and cure, a fair margin of profit is left for the grower.

I will conclude with a little information for brother-planters. Vanilla possesses two irritant poisons, which, like some other vegetable poisons, act differently upon different individuals. To a few they are innocuous. The juice of the vine, or even the rain or dew from off the leaves, produces in some an itching sensation somewhat resembling 'prickly heat.' The dry or partially dry beans produce small blisters on the hands of some of those constantly handling them, and in extreme cases sores upon the arms and body, which all itch incessantly. I have suffered slightly for years from these, and have only lately found what seems to be a cure; in my case it has proved a specific. This is carbolic acid. I use a mixture of equal parts of carbolic acid, glycerine, and rose-water, rubbed on upon going to bed. I have tried the same remedy upon a number of natives, and have cured them all. Washing with Calvert's 20 per cent carbolic soap. after handling the beans, act as a preventive.—*Chambers' Journal*, May 1

INDIAN TEA ASSOCIATION.

BOUNTY ON GREEN TEAS.

CALCUTTA, May 31, 1902.

The following arrangements, regarding the payment of bounty on the manufacture of Green teas, have been decided upon for the current season.

(*a*) That the bounty will be paid on 400,000 lb. as against 200,000 lb. last year.

(*b*) That the bounty will be the same as last year, viz., 1½ annas per lb.

Of the total quantity of 400,000 lb. on which the bounty will be paid the Baraoora (Sylhet) Tea Company, Limited, have offered to make one-half, and this offer has been accepted by the London Committee. There remains, therefore, 200,000 lb. upon which the bounty will be paid to other gardens. The object of the London Committee in accepting the offer of the Baraoora Company is to ensure that a larger quantity of green tea shall be made, as it was somewhat disappointing to find that the bounty was earned upon only 72,703 lb. last year.

2. CLASS OF TEA TO BE MANUFACTURED.—Enquiries have been made of the recipients of last year's bounty, which was given on green tea of the Gunpowder, Hyson and Young Hyson varieties, as well as upon green Pekoe and Pekoe Souchong kinds similar to the Ceylon type. The consensus of opinion is that unfaced greens of the China type are preferred, as they come into competition at once with the class of tea with which the consumer is already acquainted. But the fact that Ceylon exported to America last year upwards of one million pounds of green tea and is continuing to manufacture for America affords evidence that there is a market there for both classes, and therefore no restrictions will be placed upon the class of tea to be manufatured.

3. The bounty will be paid subject to the following rules :—

(*a*) The General Committee propose to leave the decision, as to what may be suitable for the American and other green tea markets, largely to the discretion of those who make the tea, and do not require that experimental samples should be submitted for their approval before the tea is made.

(*b*) They reserve the right, however, to defer payment of the bounty in any case where after examination of samples drawn under clause (*d*) they think the tea is likely to be found unsuitable, unti production of a certificate showing its *bona fide* sale at a price not under the equivalent of three annas per lb. in Calcutta for any separate grade in the invoice.

(*c*) The Committee, while they do not require the previous submission of samples, nevertheless recommend those who intend to make tea in consideration of the bounty to submit samples to them for the examination and report of experts. The leaf to be used for the manufacture of green tea should not be coarser than that ordinarily plucked for black tea manufacture.

(*d*) When teas upon which the bounty is claimed have arrived at port of shipment, samples should be drawn and sent to the Committee; and on approval of these, and on proof of sale or shipment, the bounty will be paid.

(*e*) There is no objection to the teas being sold on the Calcutta market if the producer so desires.

(*f*) It is proposed to pay the bounty only to those gardens which have subscribed in 1901 to the American and Foreign Market Fund, or to the Indian Tea Markets Expansion Fund.

4 I am directed to ask those who intend to make green teas to inform me of their intention as soon as possible, stating the quantity they intend making. It will be understood, however, that such an intimation will impose no obligation either on the garden to make the tea, or on the Committee to pay the bounty, should the latter not become payable—either under clause (*b*) or clause (*d*)—before the amount now allotted has been exhausted.

THE CONSUMPTION OF TEA.

(From the second number of a Board of Trade memorandum.)

TEA.

The first thing that strikes one in glancing at these tables is the enormous extent to which the tea industry is dependent upon the United Kingdom, and in particular how vital this market is to the tea industries of India and Ceylon. The tea that John Bull and his family drinks is mostly and increasingly grown under the protection of the Union Jack. We take a smaller quantity relatively every year from China. To put the matter in a nutshell, the total consumption of tea in the United Kingdom exceeds that of all the other European countries and the United States put together. During the seventeen years from 1884 to 1900 it has risen from 175 million lb to 250 millions, an increase of 43 per cent. To go into further detail, it may be added that every person in Great Britain and Ireland, counting each centenarian and baby in arms, the upper tenth and "the submerged tenth," consumes annually over 6 lb of tea, an increase of 1 lb in sixteen years.

Of a total world's production of about 600 million lb in 1900, nearly half was taken by this country, while of the actual Indian export great Britain absorbed seven-eighths and of the Ceylon export three-quarters, comparatively little being re-exported. This peculiarly British preference for tea as against coffee extends also to the purely British colonies, but not to the kindred nation of the United States.

The taste for tea can scarcely be said tobe based upon climatic conditions, since it is prevalent in the dry, hot countries of Australasia, in Canada, with its severe cold and brief spells of heat, and in the United Kingdom with its mild and moist arrangement of weather The Australians, in fact, consume more tea per head than any other nation in the world, the average being as high as 10 lb per capita in Western Australia for 1900, whereas in the United Kingdom it was 6·10lb per head. That the consumption of this country not only increases with the natural growth of the population, but increases also per capita, the average having steadily advanced, with the exception of a single year, from under 5lbper head in 1889 to 6·17lb last year, while the total consumption in the same period has risen from 185 million lb to 255 million lb. So great has been the expansion in tea production in India and Ceylon that even this enlarging market is not sufficient to cope therewith, and it is consequently reassuring to find the demand for tea slowly developing in other countries. Russia is pre-eminently a tea drinker, but the people there are so poor that the consumption per head after years of expansion was in 1901 under 1 lb per head. Germany and France which are coffee-consuming countries, show a tea consumption of only 0·13 lb and 0·05 lb per head respectively. France makes practically no progress as a tea consumer, but in Germany the beverage appears to be slowly gaining ground, while in Holland the consumption has gradually advanced to 1·48 lb per head in 1900. The United States—an enormous potential market for tea—has so far exhibited no really satisfactory expansion. Last year the consumption per head, after a gradual advance since the drop caused by the imposition of the 10 cents duty in 1897, was only 1·14 lb per head. Still the fact that consumption has gradually advanced since the duty of 5d per lb was imposed, though only to the extent of 0·21 lb per head in four years, is encouraging so far as it goes, but the progress made is almost painfully slow. Unfortunately the increase in tea consumption exhibited by America and some European countries does not necessarily mean exclusively in Indian tea. Russia still satisfied herself mainly with China tea imported over the Asiatic frontier, Holland takes 50 per cent of her tea from Java, while in the United States more than half the tea consumed is from China, and of the balance about two-fifths come from Japan.

The prospect of increasing the American demand is for our Indian and Ceylon planters if they wish to secure a hold upon that great market, to adapt the preparation of their tea to the tastes of the inhabitants. The victory of Indian and Ceylon over China tea is pretty well complete so far as the market in Great Britain is concerned, but elsewhere there is much to be done, and there is plenty of scope for the propaganda in favour of British tea, which is now being very actively supported.

China, though she has sadly fallen from her high estate, is still the largest tea producer, supplying not only a percentage of what we require, but keeping her customers in Russia and in Holland —which favours Java also—and the United States. China's decline is, nevertheless remarkable, and apparently is almost entirely due to the falling-off of imports to this country.

In the period 1884-86 the amount of tea exported from China averaged 282,000,000 lb. whilst in the period 1898-1900 it averaged 202,000,000 lb., a decrease of 28 per cent.

Meanwhile the exports of tea from the three other producing countries—British India, Ceylon and Japan—have been constantly increasing of late years; in the case of British India the exports have doubled in thirteen years, whilst in the case of Ceylon the export, which is now nearly 150,000,000 lb., was in 1884 only 2,000,000 lb.

Though tea does not seem to vary much in cost to the consumer. its wholesale price is changing, and the tendency is in favour of the consumer. In 1884 the value of the tea landed in this country averaged 11¾d. per lb.; in 1900 it averaged about 8½d. The landing value of the tea imported from different countries was British India in 1884, 14·12d.; in 1900, 8·71d. Ceylon, 17·26d. per lb. in 1884; in 1900, 8·59d. China in 1884 averaged 10·59d.; 1900, 7·85d. In the period 1884-1900 the export value per lb. of Indian tea has dropped 38 per cent., of Ceylon tea 50 per cent., and of China tea 29 per cent. No wonder that our planters are anxious to find fresh markets.

COFFEE.

In respect of coffee we have the converse of the position as compared with tea, for Great Britain and her colonies are the smallest consumers of the former, just as they are the largest tea-drinkers. British coffee is a terrible production and it is not popular, though it is used slightly more today that it was. How do we compare with the rest of the world in this respect? The three countries where the consumption per head is the largest are Holland (with an annual normal consumption of from 15 to 17 lb. per head), Belgium, and the United States. In Belgium the annual consumption per head may be put at about 8½ lb. and in the United States somewhat higher, probably over 9 lb. After these countries come

Germany, France, and Austria-Hungary in the order named. These all are the countries whose total consumption exceeds 50,000,000 lb. The United Kingdom falls far below this level with a consumption of only about 2·3 lb. per head of population. As regards total consumption (as disinct from consumption per capita) the United States stands pre-eminent, the quantity of coffee there consumed being nearly as great as that of all the other countries mentioned put together, In Germany the total consumption, though less than half that of the United States, is nearly twice as great as that of France, which takes the second place in Europe as a coffee consuming country.

The consumption of coffee per head is for Australia 0·58 lb and for Canada 1 lb, and the tendency towards an increased demand is very slight. As regards sources of production, it is estimated that in 1900, out of a total export by the chief producing countries of 1,813 million lb, 1,179 million lb came from Brazil, the next largest producers being, in the order named, the Dutch East Indies, Central America, and the West Indies, but the shipments of the most prolific of these secondary countries were under 150 million lb. Curiously enough the direct imports of coffee into this country from Brazil are comparatively small, notwithstanding that we re export more of the berry than we import. "The very small quantity of coffee that comes to this country from Brazil," says the report, "is worthy, however, of special remark, and even though the greater part of the quantity that comes from the United States be Brazilian, yet the total imports from the two countries are only about one-fifth of the whole." In view of the enormous preponderance of Brazil as a producer this fact is rather remarkable. On the other hand the United States, which is by far the largest coffee market in the world, obtains three-fourths of its supplies from Brazil, and as it imports nearly as much as all the other countries put together, its influence in the coffee market is, of course, pre-eminent.—*H and C Mail*, May 23.

CEYLON TEA COMPANIES IN 1901.

("THE FINANCIAL TIMES.")

Most of the Ceylon tea companies have now published their reports for the past year, and the results shown are, as a rule, not particularly brilliant, though in view of the conditions prevailing they are no worse, and perhaps somewhat better, than might reasonably have been expected. There was, however, one favourable feature in a generally disappointing year in the shape of a small reduction in the total output, and, although this was mainly the consequence of a poorer crop, it was also in some slight measure due to intentional limitation of production, and to the increased attention paid to the finer classes of tea. The prices realised in the early part of last year were extremely low, but towards the end of the selling season a distinct improvement set in, more especially for the commoner descriptions. It may be noted that the finer kinds of tea suffered relatively more in price than the cheaper sorts, partly because the quality was not so good as before, but mainly owing to the demand being concentrated more upon the low-priced qualities. That tendency may possibly have been assisted a little by the higher duty, but the increased impost is now scarcely a factor in the situation, and the trade has pretty well adjusted itself to the altered circumstances. It is natural that with such adverse influences to contend against the companies should, as a rule, show a diminution in profits; but we may once more point out that those concerns have emerged best from the ordeal which have strengthened their position by making substantial appropriations to reserves in good years. A bird's-eye view of the main results achieved by the leading companies may be obtained from the following table:—

Company.	Nett Profit.		Appropriations for Reserve and Depreciation.		Dividend.	
	1900	1901	1900	1901	1900	1901
	£	£	£	£	p.c.	p.c.
Alliance ...	4,660	4,870	1,000	1,000	7	6
Ceylon Tea Plantations...	41,010	37,199	10,000	5,000	15	15
Dimbula Valley	*11,306	13,501	*1,380	2,500	*10	8
Eastern Produce and Estates ...	15,790	16,839	†nil	†nil	3½	3
General Ceylon Tea Estates...	713	3,717	2,000	2,000	nil	nil
Nuwara Eliya..	18,263	11,893	2,963	2,000	7	6
Standard Tea ...	2,148	8,960	2,800	nil	15	15
Scottish Ceylon	5,318	4,154	638	429	10	8
Yatiyantota ...	6,753	5,962	1,000	1,000	4	2½

It will be observed that the Ceylon Tea Plantations has been able to maintain its dividend at the high rate of 15 per cent, but in order to do so it has been obliged to greatly reduce its appropriations to reserve. As regards this reserve, which stands in the balance-sheet at £100,000, it may be mentioned that nearly the whole of it has been invested either in the coconut plantations or in the development of the tea gardens. However, notwithstanding the smallness of the actual liquid reserve, the company may be said to be in a fairly sound financial position. It is unfortunate, however, that the coconut plantation, from which so much was expected, should still barely more than pay its way; nevertheless, the outlook in this respect is stated to be now favourable, so that in a year or two's time the company should be able to obtain a fair revenue from this source.

Another company which has maintained its dividend of 15 per cent, in spite of a considerable reduction in net profits, is the Standard Tea. It may, indeed, be doubted, in view of the lower price obtained for the company's teas, whether it was altogether sound policy to make such a large distribution this time, especially as it involved the abandonment of any appropriation for reserve or depreciation. Still, the company is reputed to possess very fine estates, which have been largely improved of recent years, and it is to be hoped that it will be able before long to get back to the higher price level of former years. The Nuwara Eliya has adopted a more prudent course, in face of a marked decline in profits, and has reduced its dividend by 1 per cent, but even to pay 6 per cent it has been obliged to draw on the balance forward. In this case also we may hope that, being a fine tea producer, with gardens at a high elevation, it may experience better luck

* Nine months' working.

† £7,500 of Debentures with bonus redeemed each year.

during the current year, The Dimbula valley, which we may note has altered its financial period so as to coincide with the calendar year, has done fairly well, and is to be congratulated upon being able to put aside a portion of its profits, although at the expense of a reduction in the dividend. This is the only company of those under review whose shares are quoted on the Stock Exchange, and consequently a little more general interest attaches to it than to the others. The Scottish Ceylon, though reducing its dividend, records fairly satisfactory results, considering the conditions obtaining, but public interest in this company's shares is comparatively small and dealings are few. The Alliance is yet another company which has been obliged to cut down its divided, but has nevertheless got through the year fairly well. In view, however, of the considerable amount of debentures it carries, and of the fact that it has no reserve fund, it can scarcely be said to occupy as strong a financial position as some of its neighbours. The Yatiyantota is notable as being a producer of low-grade tea at a very cheap cost, but the better prices ruling for this class of tea at the end of the season hardly compensated for the very unsatisfactory quotations obtained earlier. At the current range of values the company should be able to improve its position. The General Ceylon Tea Estates has come in for much adverse criticism owing to the general feeling that it was brought out at the top of the boom. We are glad to see therefore that, thanks to drastic alterations in the management, its report shows a considerable improvement, and it seems possible that there may be some future for the preference shareholders, whatever may be thought of the prospects of the ordinary. A slight reduction in dividend is likewise shown by the Eastern Produce and Estates, but the company has still been able to find £7,875 for the usual liquidation of the debentures, whereby it every year improves its financial position. A favourable feature of this company is the fact that it possesses a remunerative agency business, the profits from which, as stated by the chairman at the last meeting, are more than sufficient to defray the entire expenses of the London administration.

It is a truism to repeat that the future prosperity of the tea industry is bound up with the establishment of rational relations between supply and demand. In respect of over-production we are afraid the best that can be said is that we are a little nearer the end of the tunnel than we were a year ago. Some slight improvement in this respect was certainly shown last year, but we have still to face the prospect of the current and the following year's production being in excess of the demand. We believe, however, we are correct in saying that the extensions of gardens have now been brought practically to a standstill; and, further, it appears to be generally admitted that there has been some very considerable abandonment of less remunerative areas, and this goes far to compensate for the opening up of new grounds. The planting community, we are credibly informed, are doing their utmost to limit the quantity in favour of the quality of production, and, although we are not amongst those who believe that very much can be attained by artificial means, the effort deserves every recognition, and is decidedly in the right direction. The bright spot on the horizon is the opening up of fresh markets, which there is reason to expect will be prosecuted more vigorously than ever. The Ceylon Government has authorised an increase in the forced "cess" imposed on the planters to defray the expenses of the propaganda abroad, while a very influential petition is being presented to the Viceroy of India with the object of inducing the Indian Government to impose a similar "cess" on the planters there. If this movement be successful the future energetic cultivation of foreign markets will be assured. As regards the value of tea shares, the past season has naturally had the effect of greatly depressing prices, the few exceptions only serving to accentuate the general decline. It is probable, however, that in many cases the price has been forced down unduly, as the result of small sales upon a narrow market. Even now we are not prepared to advise people to rush into the market, but at the existing level as presented in the quotations supplied to us from week to week by the Indian Tea Share Exchange, it is quite worth watching. In particular some of the cheaper preference shares, which have been depressed in an undue degree as compared with the ordinary issue of the same companies, merit attention, since they hold out the hope of a considerable improvement in capital value sooner or later. We have not included any Indian tea companies' results in the present review, as, although the season in India coincides with that in Ceylon, only one or two reports owing to the greater distance to be traversed, are so far to hand. In a short time, however, sufficient information will be available to enable a fair appreciation to be made of the results of the year's operations in the great tea gardens of the Dependency.—*Home and Colonial Mail*, May 23.

THE BIGGEST IVORY MARKET IN THE WORLD.

Some day when Mr. Pierpont Morgan is less busy than he appears to be at present he may turn his attention to an "ivory trust." If he does so he will find the biggest ivory market in the world at the London Docks, where the quarterly sales of ivory average over £100,000; 70,000 elephants are slaughtered every year to keep up this supply. Eastern Siberia exports a vast quantity of fossil ivory, chiefly to the Continent, where it is more highly valued than it is in this country. African ivory commands a higher figure than any other description of ivory on the market. The biggest price ever paid for a pair of tusks was £188; they came from Uganda. The average price for ivory in this country rules from £30 to £40 per cwt. A great deal of ivory used to come here from India, but the Indian wild elephant is now getting very scarce and of late years India has actually imported ivory.—*Tatler*, May 21.

PRODUCE AND PLANTING.

The *Journal d'Agriculture Tropicale* for April gave a report by the Dutch Consul at Warsaw which dealt with particulars relating to the

COMPRESSED TEA TRADE.

According to this report more than 53,000,000 kilogs (a kilog is equal to 2·21b) of tea are annually imported by

RUSSIA,

of which 34,400,000 kilogs consist of brick tea, 18,000,000 kilogs of black tea, 975,000 kilogs of tablets and 280,000 kilogs of green tea. A small quantity of yellow tea is also consumed, which however is too insignificant to be taken into consideration. Green tea is rarely found in Russian households and the great majority of Russians have never tasted it. Tea in tablets is manufactured with tea leaves of inferior quality. They are 130 millimetres long (a millimetre is ·03937 inches), 40 wide and 20 thick, and each tablet is divided into eight sections. The tablet weighs ¼ lb (Russia) and is enclosed in paper bearing the name of the manufacturer. For packing purposes tin-lined cases, each containing 126 Russian lb, are used. The retail price at Moscow is 1 rouble 10 copecks per Russian lb (about 2s 7d per English lb). All the tablets used at Warsaw bear the name of a firm at Hankow. Brick tea is also manufactured at Hankow. There are two qualities : the first quality measuring 227 millimetres, long by 160 wide and 11 thick, and weighing ½ kilog. each. Bricks of the second quality measure 287 by 183 by 22 millimetres, with an average weight of 1,160 kilog. These bricks are packed in wooden cases holding from 216 to 240lb (Russian). The retail price at Warsaw is 70 copecks per Russian lb (about 1s 8d per English lb) for the first quality, and 60 copecks (1s 5d) for the second quality.—*H. and C. Mail*, May 23.

BRAZILIAN RUBBER TRADE.

In his report of 13th January, the U S Consul at Para says with regard to rubber shipments from the Amazon Valley for 1901 :—" The shipments from Para for 1901 show a steady increase over the business of 1900, the total gain being 3,255 tons of which the increase to Europe was 500 tons and to the United States 2,755 tons. In other words Europe took 14,254 tons of rubber from the Amazon in 1900, and the United States 12,621 tons during the same time ; but during 1901, Europe took but 14,755 tons and the United States took 15,376 tons. Another significant feature shown by these statistics is the enormous growth of the rubber trade at Manaos, amounting to almost 100 per cent. During the year 1900. there were shipped from Manaos a total of 8,012 tons of rubber, and 18,467 tons from Para. During the year just closed, however, Manaos shipped 15,469 tons and Para but 13,639 tons. This change was caused by the passage of a law in January, 1900, enacting that thereafter all rubber extracted in the State of Amazonas, and all other products of that State, should be shipped direct from Manaos. A large portion of this rubber had formerly been sent to Para. Another feature of these statistics is the large increase in shipments from Iquitos. During the year 1900. Iquitos shipped 920 tons of rubber direct, and in 1901, 1,391 tons, a gain of more than 50 per cent. Next year will probably witness a still greater gain and within a few years the Upper Amazon and its affluents may produce as much rubber as the lower river.

EXPORTS FROM PARA AND MANAOS IN 1901.

	Europe. Tons.	U. States. Tons.	Total. Tons.
Para ..	14,755	15,376	30,131
Manaos ..	7,336	8,133	15,469
Total ..		..	.. 45,600

—*India Rubber Trades' Journal*, ay 12.

COFFEE IN GERMAN EAST AFRICA.

The boards of the German colonial companies have clubbed together to send out an expedition to experiment with coffee planting in German East Africa.—*Planting Opinion*, June 7.

CEYLON DIVIDENDS.

It is interesting to have the following full resumè of the Dividends of Ceylon Tea Companies for 1901 from the May report of Messrs. Lloyd, Matheson and Carritt of Leadenhall Street :—

Alliance Tea Company pays a final of 3 p.c., making 6 p.c. for year,
Augusta Tea Estates Company pays preference, but no ordinary dividend.
Balmoral Company pays final of 6 p. c. free of tax, making 11 p.c. for year.
Bandarapolla Company pays 6 p.c. free of income tax.
Burnside Tea Company pays no dividend.
Ceylon Tea Plantations pays a final of 8 p.c., making 15 p.c. for year, free of tax.
Dimbula Valley pays a final of 4 p.c., making 8 p.c. for year.
Eastern Produce Company pays 1¾ p.c. making 3 p.c. for year on ords.
Ederapolla Company pays 5 p.c. free of tax.
Galaha Tea Company pays 3 p.c. on ords.
General Ceylon Tea pays no dividend.
Highland Company pays final of 2 p.c., making 4 p.c. for year, free of tax.
Imperial Ceylon pays 3 p.c. free of income tax.
Kelani Valley pays no dividend.
Lindoola Company pays a final of 1½ p.c., making 4 p.c. for year, free of tax.
Nahalma Company pays no dividend.
Nuwara Eliya Estates Company pays a final of 3 p.c., making 6 p.c. for year, free of tax.
Panawal Tea Company pays 3 p.c. on ords., free of tax.
Poonagalla Company pays no dividend.
Ragalla Company pays 4½ p.c. on ords., free of tax.
Sunnygama Company pays preference dividends of 6 p.c. up to end of 1901.
Standard Tea Company pays 10 p.c., making 15 p.c. for year.
South Wanarajah Company pays 5 p.c. on ords. free of tax.
Tyspane Tea Company pays final of 4 p.c., making 6 p.c. for year, free of tax.
Vellikellie Tea Company pays final of 2 p.c. making 5 p.c. for year, free of tax.
Yatiyautota Tea Company pays 2½ p.c. on ords., free of tax.

PLUMBAGO.

Messrs. Chapman, Anthony & Co., of 43, Gt. Tower Street, have furnished the following notes on the plumbago trade to our contemporary. There has been a sensational rise in the market from the low level reached a few months ago and those who had the courage of their convictions and bought in then have since reaped a golden harvest :—

The market during the past week has shown signs of considerable activity and we have put through several contracts in lump, chip and dust at current rates asked by shippers. Our sales have been fairly evenly distributed between the Continent and America. As we go to post, we make the tone of the market rather duller probably owing to the fact that buyers have supplied their immediate requirements. A considerable quantity of plumbago has changed hands on spot in London, as parcels which are being offered here now on estate account are being sold at prices which are considerably less than the Colombo market is asking today for the same quality.

For all good qualities of plumbago the demand seems to be on the increase, but for poorer kinds and for flying dust the supply is greater than the demand. There is some pressure to sell the latter, several parcels being offered at 5s delivered in London which is the equivalent of 4s 6d c.i.f.

HOW GEMS ARE SEARCHED FOR.

The following extracts from " Gold, Gems and Pearls in Ceylon and Southern India" (Messrs. A. M. and J. Ferguson) are of special interest, in connection with H.E. the Lieut.-Governor's visit to a Gempit near Ratnapura :—

There are two ways in which gems are searched for—one in beds of streams, and the other by sinking pits on land, generally on the borders of streams, in which previously search had been made and found to contain the gravel. At Weralupa both plans are now pursued—in the stream which runs through it, and on the meadow lands on its banks, the first discoverer of the deep-seated bed of gravel having been an enterprising resident of Ratnapura. A correct description of these modes of gemming in water and on land (as the phrases run) may not be wholly without interest. In water gemmings the implements and appliances used are few and simple, consisting of a few mamoties (called " Menik Udaloo ") stout, of an oblong square form, double the size of the ordinary ones, and concave on the handle surface, having a long pole called a *rita*, of greater or less length according to the depth of the gravel, fixed to it for a handle ; a few crow-bars to break through any impediment that may be found in the way of getting at the " illan " ; a long iron sounding-rod called *Illankoora*, and a close wicker-basket called "*Menikwattia*," made of the prepared split bamboo-reed (bata). This wicker-basket is an admirable contrivance for the purpose it serves: it is basin-shaped but more conical and about two feet in diameter, with a strong rim of rattan. A dry season of the year being selected, generally between December and March, when the water in the streams is low and sluggish, the gem-men commence operations by putting away the sand in the spot selected, sounding with the sounding rod from time to time to see whether the gravel is at an accessible depth. In this part of the business the ordinary coolies assist, but not after the gravel has been exposed—when only

THE INITIATED GEM-MEN

work. In the way of getting at the gravel, sometimes the impediments of the trunks of trees and blocks of rocks are found, but almost invariably a sort of crust called " catooa," has to be got through. The illan commonly lie just under this catooa or crust which presents different appearances at different places, though at times it is entirely absent. It is seldom of greater thickness than a few inches, but its hardness varies from almost that of granite to sun-baked bricks. Just under this crust, which varies in colour also in different localities, is found the illan resting on a bed of clay of greater or less thickness, and of different colours, even at short distances of space called "*Malawa*." I have seen it green, blue, grey, reddish, and at Balangoda deep yellow ; but the first-mentioned colours are reckoned the most promising. It is said that under the stratum of clay another bed of gravel has been found, richer than the one on the top, but of this I have no personal knowledge. The gravel being exposed though under water, it is slowly and steadily scooped out with the mamotie abovedescribed, its concave form facilitating this, and being brought to the feet of the man engaged, is then deposited in the " Menik Wattia " (wicker basket) held under water with his feet. A sufficient quantity of illan being collected, he lays by the mamotie and washes it himself, or hands it over to another to wash, and goes on with the mamotie work. The washing of the illan is the next operation to be described, and is performed on this wise. The basket being held under water by the rim, the illan in it is rotated with a quick motion, by which the clay, now dissolved, and the lighter particles of stone are thrown out at the rim. From time to time the larger stones are taken up examined and rejected if they are not gems. The whole is now reduced down to what is called the " *Nabooa*," which is the heavy, thin sand, mostly composed of particles of precious stones, jet and the gems, the objects of search, settled down by reason of their greater weight at the conical part of the basket. The basket is then brought ashore and the *nabooa* examined, when the precious stones are easily recognised and removed. The foregoing is a brief account of gemming in water.

GEMMING ON LAND

is done in the following manner :—The place being selected, also in the dry season, the operations of pitting are begun, the pit being invariably of the square shape. The earth being removed to the level of the water, it becomes soft. From this stage commence at the sounding of the pit from time to time to ascertain whether the illan is at a practicable depth, the " illankoora" in the hands of the experienced seldom misleading. The illan being found, the gem-men are obliged to re-double their exertions as now they have to contend against the influx of water which they are obliged constantly to bale out, and this the more as they get nearer the above described " crust," over which generally lies a bed of very permeable sand of greater or less thickness. The sand being got rid of, the illan is got at either after breaking through the catooa or not, if it does not exist. The illan is detached from the bed of clay with the crow-bar and heaped up to be washed, but the larger stones that are found have almost all been discovered whilst breaking the illan from its situation. After collecting the gravel, its washings take place either in the pit itself, if there be sufficient water in it, or in an adjoining stream or pond, and this by the above-described basket. It ought to be mentioned that the whole of the pit is not gemmed at once : the earth of only one-half is wholly removed at first, that of the other half being partly left constructed into a flight of steps to expedite the removal of earth and the baling of water. The first being exhausted of the gravel, the earth of the remaining half is thrown into the empty space, and the illan got out, thus saving a good deal of labour. I also omitted to mention that in gemming in water the sand of the spot on which the men with the mamoties stood, which spot is called " *Hetty Kattia*," is invariably washed in order to detect any pieces of gem which might have fallen into the water in the act of transferring the illan from the mamoties to the washing basket.

CEYLON PROPRIETARY TEA ESTATES COMPANY, LTD.

Directors.—Messrs. G A Talbot (Chairman) H K Rutherford, R A Cameron, F H Wiggin. Secretary. --Sir Wm. Johnston, Bart, Manager in Ceylon.—Mr. H V Masefield. Office.—20, Eastcheap, London, E.C.

Report of the Directors to be submitted at the Fifth Annual Ordinary General Meeting of Shareholders, to be held at the Office of the Company on Tuesday, 13th May, 1902.

The Directors herewith submit the General Balance Sheet and Profit and Loss Account for the year ending 31st December, 1901, duly audited.

The nett amount at credit of Profit and Loss Account, after providing for General Expenses, Income Tax, &c., is ..			3,505 19 5
Debenture Interest paid to 30th Sept., 1901 (*less* Income Tax) amounts to	£709 7 6		
Less from last Account	178 2 6		
		531 5 0	
Three months' Debenture Interest to 31st Dec., 1901 (*less* Income Tax) amounts to ...		211 17 6	
Preference Dividends paid for 1901 (*less* Income Tax) amount to ..		1,232 17 3	
It is proposed to write off for Depreciation ...		750 0 0	
And to carry forward to next year a Balance of ...		779 19 8	
			£3,505 19 5

During the past year the Company's Estates have given a yield of 407 lb. per acre against 490 lb. in 1900.

The gross price for the Teas sold in London and Ceylon averaged 6.36d. against 6.10d. last year and the rate of exchange is 1/4⅜d against 1/4 13-32d.

The low prices ruling for medium and low elevation teas in 1900 continued in 1901, but it is a matter for satisfaction that the prices realised for the Company's teas have been higher than during the previous year. The shorter output caused by a very unfavourable seas on, and to some extent by more careful plucking, has, however, seriously reduced the profits.

Tho following statement shows the results of the working of the Company for tho last fivo years:—

Year.	Acreage of Tea in Bearing.	Yield per Acre.	Sale Price of Tea. d.	Tea Manufactured for others. lb.	Total Tea. * lb.	Profits. £
1897	2100	413	6.90	89,307	990,816	6,277
1898	2105	407	6.94	94,370	990,251	4,834
1899	2111	439	7.11	1,681	990,848	6,790
1900	2071	490	6.10	3,331	1,119,124	3,691
1901	2165	407	6.36	..	936,485	3,124

Exchange for five years.—1897 1/3 15-32d, 1898 1/4 15-64d, 1899 1/4 13 32d, 1900 1/4 13-32d, 1901 1/4⅜.

* Estate Tea for five years.—1897 868,710 lb., 1898 857,351 lb., 1899 927,395 lb., 1900 1,016,142 lb., 1901 883,174 lb.

* Bought Leaf Tea for five years.—1897 32,799 lb. 1898 38 530 lb., 1899 61,772 lb., 1900 99,351 lb., 1901 53,311 lb.

Under Clause 69 of the Articles of Association, Mr R A Cameron retires from the Board on this occasion, but being eligible, offers himself for re-election.

The Auditors, Messrs. Harper Brothers, Chartered Accountants, also retire from office, and offer themselves for re-election.

By Order of the Board, WM. JOHNSTON, Secretary.
London, 5th May, 1902.

OUVAH COFFEE COMPANY, LIMITED.

(Incorporated in 1896.)

CAPITAL £100,000 IN 10,000 SHARES OF £10 EACH.

DIRECTORS:—Alfred Brown (Managing Director) L Famin; J G Wardrop and P C Oswald. SECRETARY:—J Alec Roberts. Offices.—5, Dawgate Hill, London, E. C.

REPORT

to be presented to the Seventh Ordinary General Meeting of the Company, to be held at No. 5, Dowgate Hill, London, on Thursday, the 15th day of May, 1902 at 12 o'clock noon.

The following Annual Accounts are now presented to Shareholders, viz:—

Balance Sheet made up to 31st December, 1901.

Profit and Loss Account for the year ended 31st December, 1901.

The receipts from the sale of produce were as under:—

	lb.		£ s. d.
Tea from the Company's own estates ..	1,029,400		
Tea made from bought leaf	68,666		
Total ..	1,098,066		31,574 1 2
Coffee 220 cwt. 0 qr. 18 lb.		..	881 14 3
Cocoa 81 cwt. 0 qr. 15 lb.		..	218 8 1
Cinchona 2,889 lb ..		..	46 10 9
Sundry sales in Ceylon ..		..	117 16 0
Value of Cinchona Bark and Cocoa under-estimated last year		..	603 6 9
Total receipts		..	£33,441 17 0

The total expenditure in Ceylon and London amounted to £27,053 10s 10d, and deducting this from the value of the produce a profit is shown of £6,388 6s 2d, to which has to be added the balance of £705 5s 4d brought forward from the previous year, making a total of £7,093 11s 6d at the credit of profit and loss.

From the above sum the Directors have transferred to the credit of Badulla Factory account £500. The interim dividend of 2½ per cent, paid on 15th, November, 1901, absorbed £2,500, and Income Tax £332 2s 1d, leaving a balance of £3,761 9s 5d, out of which it is proposed to pay a further dividend of 3½ per cent, making 6 per cent for the year and to carry forward to next account the sum of £261 9s 5d.

Climatic conditions during the past season were not favourable, and this, combined with a system of finer plucking, reduced the yield of made tea to 520 lb. per acre, against 602 lb. secured during the year 1900.

The finer plucking improved the quality of the tea, which sold at an average of 6.90 per lb. against 6.40 for the previous reason, but the smaller yield enhanced the producing cost, which rose from 24·51 cents to 28·13 cents f. o. b. Colombo.

The policy of liberal cultivation has been continued, and the Company's properties are reported to be in good heart and condition throughout.

Mining on the line of the plumbago vein has been suspended, owing to the difficulty of keeping the vertical shafts ventilated and free from water at the increased depth. Work is at present confined to driving a low-level inclined tunnel, which is expected to cut the vein of plumbago, well in advance of the present workings. This tunnel will form a natural drain from the mine, and all ore bodies will be removable by means of gravitation, which should reduce the cost of working to a minimum.

The acreage of the Company's property is now as follows :—

			Acres.
Tea, over 5 years old	...		1,926
Do Planted Nov.-Dec.	..	1897	133
Do do	..	1898	23
Do do	..	1899	18
Do do	..	1900	40
Do do	..	1901	46
Area under Tea	..		2,186
Area under Coffee and Cocoa	..		341
Area under Fuel	..		336
Forest, Patna and Waste	..		712
Total Area	...		3,575

Mr. J G Wardrop, a member of the Board, retires on this occasion, and, being eligible, offers himself for re-election.

Messrs. Deloitte, Dever, Griffiths & Co., the Auditors, also offer themselves for re-election.—By order,

J. ALEC ROBERTS, Secretary.

London, 5th May, 1902.

HUNASGERIA TEA COMPANY, LTD.

REPORT OF THE DIRECTORS.

To be presented to the seventeenth ordinary general meeting of the Company, to be held at No. 5, Dowgate Hill, London, on Thursday, the 15th day of May, 1902, at 1 o'clock p.m.

The following accounts are now presented to share holders, viz :—

Balance-sheet made up to 31st December, 1901.

Profit and loss account for the year ended 31st December, 1901.

The tea crop amounted 353,030 lb, of which 348,760 lb were sold in London for £8,873 3s 11d, giving an average selling price of 6·10d per lb. Tea was sold in Ceylon to the value of £69 3s 3d.

The expenditure in Ceylon and London, inclusive of £331 11s 7d spent on machinery, amounted to £9,901 15s 5d, showing a loss of £959 8s 3d on the year's working, and after adding to this the balance of £527 6s 3d brought forward from last year, there is a sum of £1,486 14s 6d at the debit of profit and loss account.

The area under tea remains at 763 acres, of which 31 acres are in partial bearing.

At the commencement of the year under review the price of medium quality tea stood at a level considerably under the cost of production.

In these circumstances it became necessary to make a change in the system of working, and during the past year, fine plucking has been resorted to, which reduced the crop to 353,030 lb. against 479,170 lb. secured during the previous year.

This step was taken in conjunction with the majority of tea gardens similarly situated in Ceylon and India and the desired result of curtailing supplies has to some extent been attained ; a less favourable flushing season has also helped to keep supplies within moderate limits.

During the last six months of the year the estate worked to a profit, which has gone to reduce the heavy loss sustained before prices had time to respond to the effect of shorter supplies, and the new year has commenced on a better basis.

The cultivation of the property has been fully maintained, the bushes continue to crop well, and the future entirely depends upon market conditions.

Mr J G Wardrop, a member of the Board retires from office on this occasion, and, being eligible offers himself for re-election.

Messrs. J and J Sawyer & Co., the Company's Auditors, also offer themselves for re-election,

THE ANKANDE ESTATE COMPANY OF CEYLON, LIMITED.

REPORT OF THE DIRECTORS TO 31ST MARCH, 1902

DIRECTORS :—Messrs. John Aymer, Chairman ; H Creasy, W. Rae Sands. Agents and Secretaries :—Messrs. Baker and Hall.

ACREAGE.

Tea	156	acres
Cocoa and Liberian Coffee...	104	,,
Cardamoms	95	,,
Jungle	197	,,
Total ..	552	acres.

The Directors have now to present to the Shareholders their Report, Balance Sheet and Profit and Loss Account for the year ending 31st March, 1902.

Interest on the loan of £1,500 has been paid to 30th June, 1901, but it has since been in arrear, and depreciation on buildings, viz : R250·93 has been written off.

The Directors regret to say that a sum of R2,104-70 remains lying to the debit of Profit and Loss Account, owing to the poor results of the working account which is entirely due to the shortage in crop.

The Total Crop harvested during the year were as follows :—

ANKANDE.		
Tea	lb	55,415
Cocoa	Cwts.	42-7
GLENURY.		
Tea Green Leaf ..	lb	9,778
Cocoa	Cwts.	46-2-0
ALTWOOD.		
Cardamoms	lb	2,413

and a small quantity of minor products were sold.

Mr. W Rae Sands retires by rotation and is eligible for re-election.

The appointment of an Auditor for 1902 will rest with the Meeting. By order of the Directors,

BAKER & HALL,

Colombo, June 2, 1902. Agents and Secretaries.

PLANTING NOTES.

KWANGO RUBBER.—I note that according to Mr. Deghilage, who has been for some time in the Western Kwango District of Africa, that rubber can be collected and sold in the district for 80 centimes per kilogram. The transport to Matadi costs 8 francs for 35 kilos., and the rubber is sold in Europe at 4 francs to 4-50. Surely this trade is worth developing.—*India Rubber trade Journal*, May 12th.

TOBACCO AS A GERMICIDE.—The "Lancet," replying to the invitation of "The Daily Chronicle" to make some declaration concerning the influence of tobacco on microbic life, regrets its inability to say anything definite on the point. That which it makes clear by a reference to the experiments of Tassanari is that when steeped in dense tobacco smoke for many hours certain disease germs were either scotched or kil'ed. The "Lancet" remarks that the conditions of the experiments cannot of course be represented in the use of pipe or cigar. Yet it is not at all unlikely that a very considerable effect may be produced on mouth microbes (many of which are quite harmless) by the ingestion of tobacco smoke. Possibly the soil is rendered a less fertile one for microbe development ; but microbes have an evil habit of breeding rapidly, and in the contest it is quite likely the tobacco makes only a feeble second after all. As yet I am afraid we who smoke cannot present the germicidal power of the weed as a strong argument for the anti-tobacco societies to tackle.—*Daily Chronicle*, May 8.

RAINBOW TROUT FOR EVERY RIVER AND STREAM IN CEYLON.

We direct attention to a very important suggestion made by "Piscator" in a letter which we publish elsewhere. We would ask the Committee of the Fishing Club at the earliest possible date to lay the subject and proposition—if they approve —before His Excellency the Lieut.-Governor. It is a matter of great importance to the whole community of Ceylon to add to the local Food Supply, and especially to make such a welcome addition as that of rainbow trout. "Piscator," who must know what he is saying, insists that they can be acclimatized to sea-level, so that every "ganga," "oya," and even "ella" in the island, may have the benefit of the introduction. We need say nothing in regard to the very welcome and enjoyable sport the fishing of such trout should afford. We put the matter at present, entirely on a utilitarian basis, and we trust the Fishing Club will induce the Government to take the needful action. If the Legislative Council were sitting, a motion could be made by one of the unofficial members. But, in any case, a matter of such general advantage and utility, must not be overlooked.

CEYLON AND ECONOMIC PRODUCTS.

At last we are to have a reliable hand-book on the Vegetable Economic Products of Ceylon, whether they be native or imported. The Supplements, which are now being issued with the "Annals of the Royal Botanic Gardens," Peradeniya, are being compiled by Messrs. J. C. Willis and Herbert Wright, and appear to contain all available information regarding the various products which are dealt, with. The latest Supplement dealt with Gums and Resins, and will be followed by an account of our Caoutchoucs Guttaperchas, Oils and Fats, Dye Stuffs and Tanning Substances, Fibres, Drugs and Medicinal Products. Edible Products, Timbers, Miscellaneous Products and Useful Plants, This is a great work and if we mistake not, should form a volume which for accuracy and detail will compare favourably with that of Dr. Watt on the "Economic Products of India"—one of the most useful compilations in our library of reference.

TROUT OVA.

BROWN TROUT OVA.

Of the first consignment of Brown Trout Ova which turned out so very successfully, and of which we gave our readers a statement as to the manner in which they had been distributed in various streams and shewing 1,500 fry as being still left over in the stew ponds, some few commenced to die in twos and threes, of some disease, daily. Health having been completely restored in the hatcheries, the balance of the fry were late last week put out in the streams in and about Horton Plains, while the remaining 683 were placed out in streams and about the town.

RAINBOW TROUT OVA.

Both consignments, owing to bad packing, as is known have proved failures. The actual result of the turnout, of two consignments, is estimated as early 1,600 fry, of which some died in larger umbers than the Brown trout fry during the 2nd and third week in May. These fry are now healthy and are said to be doing very well. 300 of the fry have been sent to Mr G G Ross Clarke early this week. Mr John Fraser is expected to remove 200 other fry during the present week.

THE BREEDING OF RAINBOW TROUT IN NUWARA ELIYA STREAMS.

Mr J Wickwar's letter having finally established the fact, any "doubting Thomas" who would like to satisfy his doubts would do well to visit the little tributary stream branching off in a curve from the main stream running parallel with the drive into Saint Andrew's Hotel. Here the writer who had been in quest of proof, had his attention drawn to a shoal of little fry barely ½ inch long.—*Cor.*

THE BEGINNING OF THE INDIAN TEA SEASON, 1902-1903.

Yesterday the new tea season, 1902-1903, was fairly inaugurated. What is it to bring forth? That is the present question. The days are past when tea producers and merchants entered upon each new season with light hearts and pleasing interest. The interest is there still, but it is of a much more anxious order than formerly. No longer is it, in the majority of cases, What are we going to make? but, What are we going to save? No longer do we look forward with pleasure to a big crop, in the sure and certain hope of clearing some more China tea out of our way and making room for our produce.

At present there is no reliable indication of what the present season will bring forth in the way of quality or quantity, The first teas are of the usual non-committal order. Those that were offered yesterday were neither very good nor very bad, though on a slack market they were depreciated. Cachars were perhaps a bit bolder than last year and it may be that this mark a return to the manufacture in vogue before the movement for turning out a finer tea took hold in the Surma Valley in 1901. If the Surma planters found last year's alteration did not pay, they cannot be blamed for returning to their old style of tea making, and at all events there are none to dictate to them. Each district is entitled to adopt its best gait. Of the all-important Assam there is little opportunity at present of judging. But few invoices are on the Calcutta market and there is nothing particular in these. Terais are a bit disappointing after the one or two nice teas that came from the sub-Himalayan district and were snapped up as soon as they reached Calcutta a fortnight ago. Darjeelings are plain, but the hill teas will improve as usual with the May flush and no judgment can be passed on the first plucking.—*Indian Gardening and Planting*, May 22.

AUSTRALIAN COFFEE CULTIVATION

Among the future industrial possibilities in New South Wales is that of coffee cultivation on a remunerative basis. It has already been successfully introduced into Queensland, where it furnishes employment to about a couple of hundred workers. Nearly a quarter of a century ago encouraging experiments were made in the Clarence River district, in the northern portion of the parent State, when,

from the very outset, it was demonstrated that coffee trees would grow and yield good crops of berries. There were coffee trees growing in Grafton, the beautiful Northern Coast Metropolis, upwards of 30 years ago, which yielded good crops, and at the present time several, over 25 years old, healthy and productive, are to be met with. The cultivation and treatment of the trees have (says a recent visitor) a great deal to do with the production of a berry of good quality and flavour. Then in the transformation of the berries into the brown powder-like substance which makes the popular beverage, there are many processes, on the proper execution of which depends the preservation of the essential qualities of the coffee in a form which readily assimilates with boiling water. The leading experiments in cultivation were made on a river island having an area of about twenty acres, the coffee plant being grown with other crops. Last year there were about 580 trees in bearing. It is estimated that coffee should be planted 8 feet by 8 feet, which would give 680 trees to the acre. The average production of berries on each tree is 10 lb, from which 2 lb of manufactured coffee is made. This, at 1s per lb wholesale, would be £68. The principal cost is the picking of the berries, which is put down at £3 per acre "pulping" costs £1 10s for the produet of an acre; fermenting, bleaching, and cleaning, £1 16s; roasting, £3; tinning and labelling, 15s. Total.—£13 6s for the produce of each acre. This leaves a profit of over £50 an acre, not counting cultivating expenses. These, however, are light once the trees have been planted and well grown. The ground must be kept cultivated, and the trees pruned. The work of picking the berries is light, and may be done by boys and girls, one person being able to pick from 100 lb to 150 lb per day. The next operation is that of "pulping." This is done by means of a small wooden roller, with corrugations on its surface. The object of this operation is to crack the shell, which contains two beans of a bluish-white colour. The machine used for this operation is of the grower's own construction, and with it two boys can treat 2 cwt per hour. The beans have also to undergo a process of cleaning, in which an "Enterprise" bone mill (costing £1 10s) is used. They have also to be fermented, dried and bleached, in the course of which they must be exposed to the sun no stretchers, and brought under shelter at night, and when the weather is showery. These processes cost £1 16s for the produce of an acre. The roasting process is estimated at about £3 per acre. For grinding a newly-patented American machine (costing £2) is used, which puts through 20 lb per hour. The usual addition of chicory is mixed with the coffee. Last season's coffee speedily established a reputation for its quality on the Clarence and Richmond Rivers, and has become a favourite with all who have used it, thus ensuring a ready market for all that can be raised in the future. From this it would appear that those practically acquainted with the work of Coffee cultivation would possess unlimited opportunities for turning their knowledge to profitable account in New South Wales.

Did you ever read anything more idiotic than the remarks of an Austialian Journalist on Tropical products? I recollect in the Melbourne Exhibition seeing samples of coffee from some district with a descriptive pamphlet stating that the coffee was grown from the "finest pea-berry variety!"—*Old Colonist.*]

TERRIERS AND A COBRA.

Mr. C W E Cotton, I C S, Hosur, Salem writing in the *Madras Mail* of the 24th says:—"James" and "Dolly," two English-bred fox-terriers which I am looking after for Mr. F Gompertz (now on furlough), killed a large cobra measuring 5 ft. 1 in., in the compound of this bungalow this morning. "Dolly" found the cobra lying up in some long grass on a high bank and proceeded to haul it down by the tail. It was not until it reached level ground that I realised she had got hold of a cobra, and, though I tried to cal her off, she was too excited to pay any attention. At this point "James" joined issue and gave the cobra the *coup de grace.* It was a very smart piece of work, and simply a miracle that neither dog was bitten, as the cobra showed plenty of fight and their agility alone saved them. It was an exceedingly exciting five minutes for myself and Mr. F J Richards, I.C.S., who were the sole spectators.

ACETYLENE LAMP.

Le Phare Agricole—Meduse.

This lamp, for the destruction of night, butterflies and other insects, seems worth noting. The price is moderate, *i.e.*, 16 francs (12s 10d), including packing and delivery anywhere in France. Address: V. Vermores, Villefrance, Rhone, France. The lamp is simple and strong, and cannot blow out in the wind. It is easily filled and for the intense light it gives is very inexpensive, costing, in France, only about a farthing an hour. Dazzled by the light, the butterflies fall into the receptacle around it, which contains water upon which floats some kerosine, and are drowned. When butterflies are numerouse they are caught by hundreds in a minute, One lamp has been known to dispose o. 5,000 creatures in the night. In vineyardsf the lamps are placed 50 yards apart, and only lighted on calm nights; if it is cold or windy, the insects seek shelter, and are not flying about. We publish these particulars by particular request for the benefit of planters and others.

THE DETERIORATION OF RUBBER.

Mr. James D. Sargent, of the Scottish Vulcanite Company, in a letter published in our issue of March 21st, takes exception to our statement that in the last 20 years a considerable improvement has taken place respecting the loss on washing of a number of rubber qualities, and he points out that this can refer to African qualities only. But Mr. Sargent must have overlooked that this is all we desired to call attention to. From the list we appended to our remarks, it is perfectly obvious that at best the high-grade qualities, as perhaps the American qualities as a whole, have only just held their ground. Therefore, there is hardly any difference of opinion between us Mr. Sargent goes a step further and asserts that the present loss on washing fine Para rubber is at least 18 to 19 per cent. If this is his actual experience this is difficult to contradict, but this experience is indeed not the writer's. In a considerable number of lots of fine Para, washed during the last two years and selecting only the top 7 figures, the following losses were ascertained:—16.1, 15, 15.0, 14.9, 15.9 per cent. The quantity of resinous matter in these same lots

varied from 2·2 to 2·9 per cent., average 2.5 per cent; the amount of ash varied from 0.27 to 0·59 per cent., average 0·41 per cent. These figures. certainly do not support Mr. Sargent's contention, but they would tend to show that the quality of fine Para has remained stationary.

It is not easy to account satisfactorily for the reason of the great difference between Mr. Sargent's contention and the above-quoted figures. The difficulty in this respect is all the greater as the numerous complants, which have recently been made regarding the serious adulteration of fine Para, must have some foundation in fact, although the writer has not succeeded so far in obtaining a specimen of such an adulterated sample. Perhaps the washing losses quoted by Mr. Sargent were obtained with such adulterated lots.

The fact that adulterated Para begins to appear in the market appears to us an ominous indication of the state of affairs in the rubber districts of the amazon. It seems to us highly probable that as the distances which the rubber collectors have to travel, in order to find a sufficiency of trees worth bleeding, increases from year to year, at the same rate also increases the danger of the rubber being adulterated If this is so, the determined efforts now put forth in all parts of the world to make the cultivation of rubber trees a commercial sucess come none too soon—*Inida Rubber Trades Journal*, April 28th.

TEA IN THE UNITED STATES.

New York May 7.

The market continues favourable to sellers of both Moyune and Pingsuey greens which bring full prices. Young Hyson firsts Moyune, 32c to 35c; Pingsuey Gunpowder firsts 31c to 33c; Blacks barely steady; Formosa superior, 26c to 27c. Japan steady. Today at noon the Montgomery Auction and Commission Company hold their regular auction sale of teas. The offering comprises 3,571 packages as follows: 62 packages Moyune, 47 half-chests Japan (basket-fired and dust), 839 half-chests and boxes Congou, 273 packages India, Java and Ceylon Pekoe, 653 half-chests Foochow, and 1,697 half-chests and boxes Formosa.—*American Grocer.*

CEYLON TEA COMPANIES IN 1901

A year ago many of those interested in the Ceylon industry had come to the conclusion that although the official scheme for reducing the output had fallen through as unworkable, much might be done in the way of improving the prospects by individual effort in the way of more careful selection of the leaf. This, however, as we pointed out at the time, was not enough in itself to bring about a recovery in price sufficient to compensate the planters for their smaller output, and the policy of reckless extension of the planted area would also have to be abandoned in favour of a more conservative plan which would regulate the increase in the acreage by the growth of the demand. Apparently this has been done to some extent during the year but the companies have had to suffer for their folly in the past, and nearly all of them show an enlargement of their plucking area. In spite of this, however, the efforts to restrict production evidently made some headway, although the heavy decrease in crops cannot be altogether ascribed to the forethought of the planters. Much of it was due to the adverse climatic conditions which prevailed at the beginning of the plucking season when the bad weather and heavy hailstorms experienced did considerable damage to the bushes, and necessitated the exercise of even greater care than would otherwise have been the ease to avoid permanent injury. Several of the companies venture to estimate their production for the current year, and these appeal to have learnt little or nothing from past experience, as they are apparently preparing to increase their outturn again with little thought for the probability or otherwise of a commensurate improvement in the demand.

Prices in the first six months of the year continued poor, but in the second half there was a decided recovery, due no doubt to the market having by that time realised that supplies would be reduced by the causes mentioned above. The public, however, turned its attention chiefly to the poorer qualities and for that reason the average prices secured, although higher than those for 1900 in most instances, could not be said to be altogether satisfactory. Several of the larger companies were unable to do more than maintain the 1900 level, while others, notably the Dimbula Valley and Standard, experienced serious reductions, the first of 0·87d., and the second of 0·80d., and among the smaller companies, producing less than 500,000 lb.; the Highland showed a decline of ¾d to 7¼d. The Alliance, Eastern Produce and Estates, and General Ceylon on the other hand realised moderate gains of 0·15d to 0·40d.

These higher values were insufficient in many instances to help the undertakings to secure larger revenues, partly because they were realised on smaller quantities of tea marketed but also because working expenses were proportionately heavier. The Ceylon Tea Plantations and the Standard of Ceylon managed to maintain their dividends at 15 per cent., but in both cases it was at the expense of the allocations to reserve and depreciation, which in the first-named were reduced by half and in the latter abandoned entirely. By the same plan of reducing the depreciation allowance from £629 to £300 the Ederapolia contrived to increase its distribution to the shareholders by 2 per cent. to 5 per cent. The Imperial Ceylon Company with an increase of over £700 in its net profits, again transferred £500 to depreciation account and increased its dividend by ½ to 3½ per cent., the Bandarapola paid 6 per cent. against *nil* in 1900 and the Rangalla paid 4 per cent in each year, in addition to doubling its depreciation allowance, These, however, were the only companies to improve or even maintain their previous record and all the others were forced to cut down their return to the shareholders from 1 to 2 per cent., notwithstanding the fact that most of them at the same time devoted less to depreciation. The Nuwara Eliya was perhaps the most prominent example of this unfortunate state of affairs, and was only able to pay 6 per cent. compared with 7 per cent. a year ago, after setting aside £4,655 less, but the Portmore was still more to be pitied, as it could not afford to make even the same small provision of £207 as in 1900 in its effort to keep up the dividend, and even then had to be content with paying 12 against 13 per cent. Such a record as our tables display are not calculated to induce any great hopefulness for the future, especially as the results of the over-planting have not yet been felt to their full extent, and there is every prospect that the trade will have to face a still great excess of supply over demand unless the

efforts now being made to find new outlets for the produce of the gardens meet with a more ready response than at present seem probable or even possible. In time no doubt the new markets will be opened up, but until they are secured the industry will have a hard struggle for existence.

Company.	Plucking Area. 1900. Acr's.	Plucking Area. 1901. Acr's.	Crop. 1900. lb.	Crop. 1901. lb.	Price per lb. 1900. d.	Price per lb. 1901. d.
Alliance ..	2,657	2,655	1,210,907	1,086,861	a6·43	a6·60
Bandurapola ..	782	782	487,432	468,901	5·51	6·25
Burnside	1,134	—	402,113	353,284	6·30	6·58
Ceylon T Plantations ..	8,913	8,962	4,432,132	3,957,335	7·15	7·41
Dimbula Valley ..	—	—	1,091,963	1,193,357	8·98	8·11
Eastern Produce & Est'te	10,960	11,028	4,045,146	3,830,383	6·51	6·61
Ederapolla	995	—	554,430	508,058	5·79	6·19
General Ceylon ..	5,281	5,436	2.525,088	2,371,738	5·79	6 04
Highland...	617	—	262,510	241,481	8	7¼
Imperial Ceylon..	1,451	1,630	655,814	647,742	a6·03	a6 58
Kelani V...	1,212	1,715	662,248	549,906	5·79	6·21
Nahalma	446	446	208,419	185,268	—	—
N'Eliya ..	2,443	2,506	1,458,911	1,225,614	a8 66	a8·48
Panawal..	590	590	339,550	273,322	—	—
Poonagalla	1,237	—	480,886	396,593	6·54	7
Portmore	480	—	265,710	226,282	9·52	9·72
Rangalla...	695	716	218,572	230,002	a6·46	a6·49
Scottish Ceylon..	1,720	1,720	899,806	795,098	6·94	7·08
Standard	2,468	2,481	1,129,753	1,105,996	a7·58	a6·78
Yatiyantota ..	2,854	2,972	1,470,590	1,261,484	a4·56	a5·10

a Net sale price.

We are compelled to publish this table in an incomplete form as our efforts to secure the necessary particulars were unsuccessful. In some instances the secretaries of the companies promised to supply the information required but have failed to do so, and in others our request has been ignored.

Company.	Net Profits. 1900. £	Net Profits. 1901. £	Sums put to D'reciation, &c. 1900. £	Sums put to D'reciation, &c. 1901. £	Dividends 1900. %	Dividends 1901. %
Alliance	4,660	4,869	1,000	1,000	7	6
Bandarapolla	823	2,224	627	1,026	—	6
Burnside	—235	—743	—	—	2	—
Ceylon tea Plantations	41,011	37,199	10,000	5,000	15	15
Dimbula Valley	a11,686	14,000	1,000	2,500	10	8
Eastern Produce and Estates	15,787	16,839	b7,875	b7,875	3½	3
Ederapolla	1,389	1.336	625	300	3	5
General Ceylon	714	3,718	2,000	2,000	—	—
Highland	2,439	1,499	500	250	6	4
Imperial Ceylon	2,327	4,062	500	500	2½	3
Kelani Valley	601	613	—	638	3	—
Nahalma	—1,544	—653	—	—	—	—
Nuwara Eliya	23,743	11,893	6,655	2,000	7	6
Panawal	1,567	923	506	—	4	3
Poonagalla	474	—1,234	—	—	2	—
Portmore	5,407	4,376	207	—	13	12
Rangalla	1,459	1,669	500	1,000	4	4
Scottish Ceylon	5,319	4,154	638	429	10	8
Standard	14,085	8,960	3,200	—	15	15
Yatiyantota	6,753	5,963	1,000	1,000	4	2½

a Calculated on results for nine months.

b 7,500 debentures paid off each year with bonous of 5 per cent.

—*Investors' Review*, May 24.

"SOLUBLE TEA EXTRACT."

A CEYLON PREPARATION TO BE EXPLOITED BY A LIMITED COMPANY.

"Soluble" tea is by no means a new idea. Many attempts have been made by different people for years, but without success, to produce an extract of tea, which would retain all the well-known and popular characteristics of tea in its ordinary form. The local inventors (Messrs. John Rogers and Kelway Bamber) of the new "Soluble" tea, claim that, by their patented process, they have produced an article which makes a sound wholesome cup of tea and one which has been favourably reported on by experts and others in Ceylon, England and elsewhere. This

"SOLUBLE" TEA IS ABSOLUTELY PURE

and no chemical or chemical process is employed in its manufacture. Moreover, its keeping qualities are proved by the fact that samples made two years ago are stil favourably reported on. Like ordinary tea it must be kept in air-tight packages; otherwise, owing to its having a similar hygroscopic character it will in the same way lose in point and quality if exposed to a moist atmosphere. Its convenience in use is evident from the fact that the mere addition of either hot or cold water is all that is necessary, sugar and milk being added to taste. It is expected that its convenience in use will find for it new markets in countries where tea is scarcely in use at all, and in Coninental armies and navies and that it will be used by travellers, the man in a hurry, and colonists, and others in out-of-the-way places. Its purity and wholesomeness will commend it to people of weak digestion, as a cup of "Soluble" will contain less tannin than a cup of ordinary leaf tea. "Soluble" tea will

SUPPLY A LONG-FELT WANT

in tea such as the wellknown essences did in coffee. It certainly will not displace tea in its ordinary use, but it will be used when it would not be convenient to infuse leaf tea in the usual way. It will doubtless displcae coffee essences in some measure, and some so-called non-intoxicating drinks. "Soluble" tea can only be made from good green leaf In fact, as in ordinary tea manufacture, the better the leaf the better the tea, and a blend of samples made from different estates in different districts has been found to give the best results. It is expected that, as for every pound of "Soluble" tea made three pounds of leaf tea will be removed from the market, the introduction of this new product will in some measure

RELIEVE THE OVER-SUPPLY OF THE MEDIUM SORTS OF TEAS

which bulk so largely in the tea-sale lists both in Colombo and London. "Soluble" tea manufacture will be carried on in the existing tea factories, but will probably require more personal supervision than ordinary leaf-tea making.

THE PLANTING ENTERPRISE OF CEYLON.

IN JUNE 1902:

IN TEA, CACAO, CARDAMOMS, CINCHONA, RUBBER, COFFEE AND MINOR PRODUCTS.

6,000 ACRES LESS IN TEA; 5,000 ACRES MORE IN RUBBER, CARDAMOMS, CINCHONA, CACAO, ETC.

Omitting the usual elaborate analysis and review, we summarise the information sent to us in correction of our Directory and here present the results in the briefest possible form:—

			Acres.
Total area of 1,906 plantations and planting properties			817,933
Total area of 1,539 plantations in cultivation with 1,493 Superintendents and Assistants (apart from Conductors, &c.) ..			460,215
Total approximate extent under Tea ...			382,343*a*
Do	do	Cacao ..	24,136*b*
Do	do	Cardamoms	8,621
Do	do	Coffee (*Arabica*) ...	4,304
Do	do	Coffee (*Liberica*) ..	758
Do	do	Cinchona [8 to 9 million trees or plants] =	3,471
Do	do	Rubber ...	3,356*c*
Do	do	Grass (Cultivated) ..	4,461
Do	do	of Camphor, Annatto, Coco, Kola, Ramie, Vanilla, Pepper, Cloves, Citronella grass, Divi-Divi, Croton, Castor-oil, Aloes, Cinnamon, Tobacco, Cotton—in our plantations' list ..	11,201
Coconuts, Arecas, Nutmegs, Fruit trees (on the cacao, tea, or coffee plantations) ..			22,696
Of Fuel, Timber, Sapan, and Kapok (on he tea, cacao or coffee plantations) ..			7,576

The most notable fact is the falling-off in the area of Tea--our total in cultivation on plantations being 4,000 acres less than a year ago, or including native gardens a decrease of 6,000 acres, making a total of 386,000 in place of 392,000 acres. This must be due to the abandonment of non-paying fields and some unprofitable gardens; for it is accompanied by an extension of the total extent in cultivation by 1,000 acres, although poor "Coffee" has gone down, being 3,200 acres less than a year ago. Cacao on the other hand is 500 acres more in planted extent; Cardamoms are greater in area by 1,800 acres; Cinchona shows an increase of 1,000 acres; and Rubber of nearly 1,000 acres—which must, however, be rather under the actual area planted during the year, our total extent planted being about 3,400 acres. In several minor products, too—Camphor, Nutmegs, Crotons—there has been a good deal of planting; and still more have we had in the Kelani Valley and other low-country estates, a planting out of Coconut Palms among the Tea, just as Para Rubber has been put in freely on the Kalutara tea estates.

The check to Tea, and the fact that there are no clearings this year to plant, ought to strengthen the hopes of those who believe in a future for our staple, so soon as consumption overtakes production. A year ago we anticipated that there would be 400 000 acres under Tea at an early date in Ceylon; whereas now we are in reality back to 386,000 with no immediate prospect of extension.

a This is apart from perhaps 3,000 acres still cultivated in native tea gardens of small extent; so that the grand total under tea in Ceylon in June 1902 may be taken at say 386,000 acres.

b Apart from 7,000 to 8,000 acres in native gardens.

c Chiefly young, and interspersed with other products.

PLANT SANITATION IN INDIA.

THE "PIONEER" ON MR. J. B. CARRUTHERS' SUBJECT.

A striking instance of the progressive specialisation in agricultural science is to be found in the latest issue of the *Contemporary Review*, which contains an article by the well-known authority Mr. J B Carruthers, entitled "Plant Sanitation," and dealing with the methods adopted by advanced communities for the prevention of ordinary plant diseases. Not very long ago an agricultural experiment station was considered to be adequately equipped if it was supervised by a chemist and had a botanist on the staff; nowadays there should be at least ten experts in different branches of science; soil-physics, agricultural entomology, cryptogamic botany, bacteriology, vegetable pathology—each of these requires an expert, and the latest development is the sanitary inspector. In the United States the foundation of the whole system appears to be based on compulsory notification of disease, combined in some cases with regular inspection of nurseries.

Now there can be no doubt that India offers ample scope for plant sanitation. Mr. Carruthers quotes the well-known estimate that the annual loss to this country from wheat-rust alone amounts to ninety-one millions sterling, though by some curious error he attributes this damage not to wheat rust, but to the ravages of the hop-aphis! The destruction of the mango crop in wet seasons is believed to be due to an insect; the occasional entire loss of the mohwa crop may possibly have a similar cause; sugar-cane suffers enormously from grasshoppers, borers and fungoid pests, rice and poppy from caterpillars, and almost every field crop grown largely in the country has its own peculiar enemies. Of general enemies to plant life it is sufficient to mention the locust, whose ravages we have recently discussed.

What is wanted is organised and sustained research into the life-history of our pests; and we welcome the recent strengthening of the Imperial Agricultural Department by the appointment of a cryptogamic botanist and an entomologist as an important step in this direction. But where the area of research is so vast, a few experts cannot make rapid progress; they require the co-operation of trained observers all over the country. To take an instance: the intermediate host of the wheat rust in this country is still unknown;

"intermediate host" it may be explained, is the technical term for the plant on which the fungus lives during the interval between one crop and the next, much as the malaria parasite finds a temporary rest in the body of the mosquito. The search for this intermediate host, if indeed there be one, for even that is still a matter of doubt, involves the patient examination of every shrub and weed that exists during the rains, an impossible labour for any individual, but quite within the power of an organised band of zealous students. It is the absence of the trained observer that, more than anything else, retards the progress of agricultural science in this country, and it is one of the main arguments for the establishment of agricultural colleges that they would in time tend to remove this difficulty; but in the meantime the experts must work alone.

But the question is sure to be raised: Supposing you know all about the pests and have found means of combating them, what is the good? The cultivator will take no notice of your suggestions, even if he ever happens to hear of them. This is in fact the great obstacle to improvement in the agriculture of this country, and it is too large a subject to be discussed at the close of an article. Briefly speaking, our view is that information on such matter must proceed from the experts to the wealthy landholders, and from them to their tenants; and this is the second

ARGUMENT FOR ESTABLISHING AGRICULTURAL COLLEGES,

and using all legitimate means to induce the sons of the landholding classes to attend them. Something doubtless can be done by lessons in the elementary schools, but results obtained in this way will be very limited, and not to be compared with what will follow when in every district there are a few landholders cultivating their *sir*, or home farm, in accordance with the teachings of science, and influencing their tenants to follow their practices in combating disease. In this way a natural system of sanitary inspection might gradually be evolved, for a landholder who saw his tenants allowing preventible disease to spread would probably take effective steps to protect his own interests. Paid inspectors are of course out of the question, at least for very many years to come; but it is only a natural development of the authority of the landholders that they should take the lead in influencing their tenants and neighbours for objects that will benefit all alike.—*Pioneer*, June 11.

PLANTING NOTES.

SIR FRANK SWETTENHAM has made a grant of R8,750 for the purpose of completing the publication of the "materials for a Flora of the Malay Peninsula,' by Sir George King, formerly Superintendent of the Botanic Gardens near Calcutta. Its publication had been stopped for want of funds.—*Straits Times*, May 16.

THE VALUE OF GREVILLEAS—is usefully argued in Mr. Maclure's letter to the Mycologist quoted elsewhere. At 15 years, the correspondent reckons, a grevillea is worth R3·40, and a tea-bush a small fraction of this: so where crowding occurs he would remove the tea-bush. Have other planters' experiences and estimation of the grevillea been different?

ESSENTIAL OILS.—All concerned with citronella, cinnamon, camphor and clove oils will peruse the report of Messrs. Schimmel & Co., quoted on page 37 with peculiar interest. We had no idea that Java had gone in so extensively as it has for citronella oil.

A SPECIAL MANURE TO SECURE QUALITY IN TEA—is likely to be the next improvement made available to the tea planter. The working-out of the constituents are in competent hands and careful experiments are to be made, so as to afford satisfactory tests, before the new fertiliser is brought to the notice of the planters generally.

200,000 GALLONS OF WATER A DAY.—"What is said to be the deepest artesian well in Rangoon has just been completed by Mr D D Coath at the Italian Colonial Company's mill at Dowbong. The well is 348 feet deep, and at a recent test gave water at the rate of 200,000 gallons a day. During boring a boulder was encountered about 200 feet from the surface; that tube had to be withdrawn and put down in another place."—*Times of Burma*, April 26.

PRODUCE AND STOCK IN THE NORTHERN PROVINCE.—Interesting information from the, Government Agent's Report on Tobacco-Wild Beast Destruction, Cattle, and Horses breeding in the Northern Province is quoted today. In the islands devoted to the latter there has been serious mortality both in horses and cattle. On Iranativu a poisonous plant, which Mr. J. C. Willis may be called upon to investigate, is thought to be the cause: insufficiency of pasture accounts for it among cattle on Delft. General Olivier, it appears, has offered valuable suggestions.

"MACHINERY IN THE TEA INDUSTRY."—We have received from Feilden Publishing Company, Limited, a Copy of "Feilden's Magazine" for April 1902, which contains the first part of an interesting article on "Machinery in the Tea Industry" from the pen of Mr H J Kersting Green. The article is intended for readers at Home and elsewhere who have never had the opportunity of visiting a tea estate and seeing for themselves the buildings and machinery erected thereon. The article is well-illustrated, and will prove of value to planters in foreign lands (other than India), who may be thinking of going in for tea.—*Indian Planters' Gazette*, April 26th.

THE TRADE OF JAMAICA.—For the year ending March 31st, 1901, the following were among the Exports from the Island:—Ginger 26,530 cwt, value £66 324; logwood 34,006 tons, value £98,618; pimento 100,547 cwt, value £110,602. In the previous year the figures were: Ginger 2),205 cwt, value £60,615; logwood 28 871 tons, value £77,971; pimento 123,973 tons, value £173,562. The falling off in quantity of pimento was due to short crops resulting from unfavourable seasons: The price moreover, fell from 28s to 22s per cwt. Logwood shows an increase in quantity, price and total value the last by £20,647. Logwood extract was valued at £31,599, in place of £15,881 in 1899-1900. The bee-keeping industry, which is almost entirely in the hands of persons of limited means, shows remarkable improvement, honey having increased in value in five years from £1,891 to £10,739. This fact indicates the exercise of increased intelligence and industry.—*B. and C. Druggist*, May 9.

TO THE PLANTING WORLD.

Seeds & Plants of Commercial Products.

Hevea Brasiliensis.—Orders being booked for the coming crop August-September delivery 1902, booking necessary before the end of April, quantities of 100,000 and over at special low rates. Plants available all the year round, 100,000 and over at special low rates. A leading Rubber planter in Sumatra, who purchased 50,000 seeds in 1899, and 100,000 in 1900, writes us, under date 15th November, 1900 :—"I received your letter of 26th October, from which I learn that you added another case of 5,000 seeds to replace the loss, &c. I am satisfied hereby, and even after this adding I am satisfied by tho whole delivery of this year." Special offer, post free on application.

Castilloa Elastica.—True superior variety cultivated in Mexico, seeds from specially reserved old untapped trees. Orders booked for August-September delivery 1902, immediate booking necessary; large quantities on special terms; Plants in Wardian cases.

A foreign firm of Planters writes under date 14th October, 1901 :—"We beg to enquire whether you would procure us 100,000 Castilloa seeds, in which month we might expect them, and what would be tho average price." Special offer, post free on application.

Manihot Glaziovii.—Seeds and Plants available all the year round, 100,000 and over at special low rates. A Mexican planter in sending an order for this seed wrote on the 22nd August, 1900 :—"If they arrive fresh and germinate easily I may send you larger orders, as they are for high ground where the Castilloa does not thrive."

Ficus Elastica.—Seeds available in May-June; booking necessary before the end of March; also plants.

Mimusops Globosa (Balata) wood of the tree is much sought for buildings, fruits sweet like a plum and eaten, oil from seeds, said to yield as much as 45 lbs. of dry rubber per tree per annum, the milk is drunk and when diluted with water used as cow's milk, grow from sea level up to 2,000 feet, orders being booked for seeds and plants, price on application.

Cinnamomum Zeylanicum (Cinnamon superior variety).—New crop of seed in April to June; booking necessary before the end of February; also plants.

Coffee Arabica, Liberian Hybrid and Maragogopie Hybrid.—New crop March-April; immediate booking necessary.

A foreign Agricultural Department writes dating 9th September, 1901 :—"Please accept our order for 175 lbs. of Tea seed and for 2,000 Coffee beans. In regard to Coffee seed I would say that this will be the first importation made by this department, and we will leave tho selection of the varieties to be sent to your judgment."

OUR DESCRIPTIVE PRICE LISTS.

The following six Descriptive Price Lists are now being forwarded with Circulars and special offer of Seeds and Plants of Rubber and other Economic Products :—

1. Tropical Seeds and Plants of Commercial Products, enlarged edition for 1902.
2. Seeds and Plants of Shade, Timber, Wind-Belts, Fuel, and Ornamental Trees, Trees for Roadsides, Parks, Open Spaces, Pasture Lands, Avenues, Hedges, and for planting among crops (Tea, Coffee Cacao, Cardamoms, &c.)
3. Seeds and Plants of Tropical Fruit Trees including Mango grafts.
4. Bulbs, Tubers and Yams.
5. Orchids—Ceylon and Indian.
6. Seeds and Plants of Palms, Calamus, Pandanus, Cycads, Tree and other Ferns, Crotons, Roses, Dracinas, Shrubs and Creepers.

Special Arrangements made with foreign Governments, Botanical and Agricultural Departments, Planters and others for supplying seeds and plants of Commercial Products in large quantities.

"SOUTH AFRICA."—The great authority on South African affairs of 25th March, 1899, says :—"An interesting Catalogue reaches us from tho East. It is issued by WILLIAM BROTHERS, Tropical Seed Merchants of Henaratgoda, Ceylon, and schedules all the useful and beautiful plants which will thrive in tropical and semi-tropical regions. We fancy Messrs. Williams should do good business, for now that the great Powers have grabbed all the waste places of the earth, they must turn to and prove that they were worth the grabbling. We recommend the great Powers and Concessionaries under them to go to William Brothers."

Agents in London :—MESSRS. P. W. WOOLLEY & Co., 90, Lower Thames Street.

Agent in Colombo, Ceylon :—E. B. CREASY, Esq.

Agent in British Central Africa :—T. H. LLOYD, Esq., Blantyre.

Telegraphic Address :
WILLIAM, HENARATGODA, CEYLON.
Liber's, A 1. and A.B.C. Codes used.

J. P WILLIAM & BROTHERS,
Tropical Seed Merchants,
HENARATGODA, CEYLON.

Correspondence.

To the Editor.

RUBBER PLANTING IN COSTA RICA

April 25.

DEAR SIR,—As far back as January last I promised to write you an article on Rubber-planting in the San Carlos Valley, and intended at that time to have made a trip over there, and to furnish some newer information and experiences acquired personally. This I have not been able to do; when we got through with the handling of the past coffee crop about the middle of March, I was taken with acute neuralgia in the head, and from this I am still suffering. I had, therefore, to avail myself of the kindness of Mr. Alfred Long, an American, who is settled in the San Carlos Valley on quite a large scale, for most of the information that follows. Mr. Long returned a few days ago, after spending about two weeks, visiting the more settled parts of the Valley.

Mr. Theodore Koschney, well-known to you and to the readers of the *Tropical Agriculturist*, is without doubt the oldest living of foreign settlers in the San Carlos Valley, as well as the most practical of Rubber planters, his experience running back over some 25 years in the district. Strange to say that, though at all times interested in Rubber for the purposes of trade, his own plantation should consist of Rubber trees not over two years old, which he has planted and kept up in a way dictated to him by his own observations, and all his plantation is so far of very good promise.

Mr. Koschney's method of planting calls for the preparation of a seed-bed six or eight months previous to planting, and as handy as possible to the plantation, and the felling of the virgin forest to admit of a liberal amount of sunshine on the ground, leaving it under what is termed "light shade." This felling is quite a matter of judgment with the planter, and he varies it according to the kind of timber, and the dryness or humidity of the soil, these being the principal things to consider. At the time of planting the six-or-eight-month seedling is between 18 and 30 inches high; and though some have planted the seeds themselves 2 or 3 to each stake, there is nearly always a heavy loss from the small lizards or chirbalas, and replanting never ends. A cleaning is given to the young Rubber about 3 months after planting. This is not more than a rough chop-down 4 or 5 feet on each side of the

ROWS OF PLANTS

(which are set about 18 or 20 feet apart both ways) and is repeated 5 or 6 months later, and kept on pretty much in this manner once or twice a year to ensure the Rubber tree good freedom from the scrub or undergrowth, while at the same time it is being shaded overhead by the trees of the virgin fore t left standing. The style of Rubber tree thus obtained is similar in growth to the forest Rubber tree, a long straight trunk with but few extending branches. In the preceding manner Mr. Koschney planted about 6 hectares (15 acres) for his neighbours, Messrs. Kotelmann and Heynsohn, about 6 years ago, and so far the plantation leaves nothing to be desired. Mr. Koschney has several rubber trees of long standing in his pastures and other cleared ground, quite sufficient to prove that, alone in the open the Rubber tree cannot flourish, a large number of lateral branches being developed; the flow of late is very small and of poorer quality, and the tree often dies after a few tappings. The only known advantage of the Rubber tree grown in the open is that for production of seed it is more prolific. In past years Mr. Koschney experimented unsuccessfully by adopting another method—that of felling all the timber after scattering Rubber seed broadcast. Bananas were planted also at the same time. At first the Rubber came up like corn, every seed seemed to have sprouted, but in a few months many died, and the increasing growth of the bananas affected the balance unfavourably.

Mr. Carl Grutzmacher, a settler in Caño Negro, is a strong advocate of another system in

RUBBER PLANTING,

differing considerably from the "light shade" method, and though his experience does not cover many years, his hopes of success are very bright at the present time. It calls for the seed-bed 6 or 8 months old, but the felling of *all* the trees in the forest for planting, the young plants being set out in rows 18 or 20 feet apart both ways. Three months later a cleaning is done, about 4 feet on each side of the rows of plants, and so on at regular intervals of 3 months until the plantation is 1-year old, when everything is cut down again, and the rubber trees stand alone in the open, but only for a short time. In about 3 months the soft-wood or charral growth is up again almost equal to the small Rubber trees, and another cut down in the rows is given, and repeated at gradually increasing intervals, serving to give at all times an advantage in height to the Rubber tree above the charral, the latter serving as perpetual and regulated shade to the trunk of the tree, but with no large forest trees to shade its crown. The growth of the tree is also similar to that of the wild Rubber tree. A little observation is needed to see that this is a tree grown precisely under the same conditions as the forest Rubber tree, which is always found among charrals or shrub growth There is a disadvantage in the first cost of this method, it being more expensive to fell all the virgin forest than a part of it, and at the same time leaving the ground more encumbered; and the clearings for the first 2 years are more frequent than in the "light shade" method, after which time they run about equal. Time is needed to show which of the two systems is the be ter: in results the "heavy shade" and "in thet open" Rubber trees have both turned out failures, andare not being repeated where they have once been tried.

The only kind of Rubber planted in the Valley is the Castilloa Elastica, and most of it on the flats at an altitude of 400 feet and less above sea-level, though one of the newer plantations—that of Mercedes Quesada is somewhere about the 1,500 feet level.

Many of the foreign settlers are at present hanging fire to see what the U. S. Government determines on the Isthmian Canal question. Should the Nicaraguan route be voted for, hundreds of families would be down in a short time from the States; in the other case many will draw out and abandon what they have invested in.

The following is a list of settlers who have made Rubber Planting their business in San Carlos Valley:—

1—Messrs. Umfried and Schoch at the head of Tabla Grande with 40 hectares (100 acres) which they started to plant 4 years ago.

2—Messrs. Hoppenstadt and Gillett in Banco de la China, 3 hectares, all planted 6 years ago.

3—Mr. A. Long below the mouth of Arenal river, 37 hectares, all planted at different dates since 1897.

4—At the mouth of the river "Tres Amigos," an American family the Hogans are at present making preparations to plant Rubber on a large scale.

5—Mercedes Quesada has about 6 hectares of 6-year-old Rubber on his estate in very good condition.

6—Messrs. Kotelmann and Heynsohn have about 6 hectares of 6-year-old Rubber planted for them by Mr. Koschney in excellent condition and has had one tapping.

7—Mr. Koschney has on his estate 25 hectares of 2-year-old trees, 11 hectares of 1-year old Rubber and 16 more being planted.

8—Mr. Koschney together with other planters have planted in Caño Negro 4 hectares barely a year old, many of the trees being now 2 metres high, 100 hectares being now actually planted and preparations being made to plant 350 hectares more.

9—Mr. Long has in Caño Negro 6 hectares planted about 1-year old and is preparing to plant 30 hectares more.

10—Max Bergmann has several hundred trees planted in Caño Negro, 1 to 3 years old, all in good condition.

11—Carl Grutzmacher has about 4 hectares planted in Caño Negro, 3 years old, in very good condition.

Hoping that you will find the foregoing of sufficient interest to publish.—I remain, yours very truly,

ED. COLES.

SUNSPOTS AND EARTHQUAKES.

SIR,—Of the times and the seasons we are told we can have no exact knowledge; and though men have professed to interpret the dark sayings of scripture, most intelligent people believe that there is an impenetrable veil drawn over the time when the world will come to an end, which man cannot pierce. Still, one may reverently regard the trend of great events which convulse the world, without exhibiting any undue curiosity, and without professing the prophetic gift. The connection between sun-spots and seismic disturbances seems now well established from the scientist's point of view, but was not the connection foretold in a way in St. Luke's Gospel (XXI. 25)? "And there shall be signs in the sun and in the moon, and in the stars; and upon the earth distress of nations, with perplexity; the sea and the waves roaring; men's hearts failing them for fear, and for looking after those things which are coming on the earth." Was there ever a time when the conjunction was more marked of signs in the heavens and of convulsions (physical, moral, intellectual) on the earth? STUDENT.

TROUT IN CEYLON.

May 19.

DEAR SIR,—It is a pity "A. J. M." should have gone so far afield as the "Asian" *re* rainbow trout breeding in Ceylon, as his doing so has prevented myself and others from criticising his remarks prior to his going to glory in South Africa.* If "A. J. M." is still within the bounds of civilization he will no doubt see this, so I beg to assure him the fry in the Ambewala stream are not trout fry. May I now publicly ask Messrs. Farr & Sparling to catch a few of those fry and little fishes they are so certain about being young trout, and to satisfy themselves that they really are trout? They might send a few to the Hon. Secretary of the Fishing Club and the Curator of the Museum, so that there may be no question as to their identification as the settling of this point, once for all, is of considerable importance to the Fishing Club and the whole community in fact. Mr. Farr says there are on native fish in the Hortons stream. I say there are. Hence my doubts now, though at the time I said I'd swallow all Mr. Farr reported—the wish, I fear, being father to the hope, but do let us have the point authoritatively settled. As to "A.J.M.'s" animadversions upon the varying sizes of the fish in my pond, I doubt if it is worth while wasting your space, but I should have liked to reason with him on the subject.

Any child born on a river bank will tell you that trout of similar age vary in size, whether they be in ponds or rivers. My pond is about the size of your bath tub. I got 197 rainbow fry from the Fishing Club in May, 1900. I repeatedly cleared out the larger fish of from 3 in. to 6 in. during the following twelve months, and in May, 1901, the remaining 25 varied from 2 in. down to the size they were when I got them, which was about 1 in. I turned these dwarfs out last month and they then ranged from 2½ lb. down to about an oz. or two, as three of them were still only about 3 in. long. And yet, in face of this, "A J.M.", whose friend caught a 4-in. trout, dogmatically informs us and all Asia that trout have been breeding in Ceylon for years! My fry were fed three times daily and food on the Hortons is not over superfluous. Do give us something definite, please.—Yours faithfully,

JOHN FRASER.

P.S.—By the way out of the 197 fry I received, I reared 127 trout. I think you will find this is not at all a bad outturn for Asia or anywhere else. J. F.

POTASH SALTS.

Colombo, May 22.

DEAR SIR,—Enclosed we beg to hand you copy of a leaflet published by us, entitled "The Value of the Stassfurt Potash Salts," the contents of which, we trust, will be of interest to your readers.—We are, dear sir, yours faithfully,

FREUDENBERG & CO.

---

* "A. J. M." have gone to the Coronation.—ED. T.A.

[The leaflet gives an interesting account of how 15 mines near the Hartz Mountains supply rich Potash Salts which are found to be of great value in the manuring of tea and cacao, the favourite preparation being "Sulphate of Potash" with a purity of 90° to 96° equal to 50° to 52° of pure Potash. Planters of tea and cacao should apply for copies of the leaflet which gives good deal of useful information.—ED. *T.A.*]

USEFUL AND ORNAMENTAL TIMBERS.

Hanwella, May 31.

DEAR SIR,—Referring to your notes and comments in your paper of the 29th inst. *re* "The valuable timber tree," the *suriya mara*, I am surprised to hear of its being used for the construction of bullock bandies. I think, even in Ceylon, it is a rare cabinet wood, far more valuable than nedun, though similar in appearance, but heavier than nedun,

Suriya (Tulip) is the wood par excellence used in building all sorts of conveyances in the island. Its heartwood is of a dark red colour, and is very light in weight, a cubic foot being equal to about 40 lb. I may mention here that there are four kinds of *mara* found in the Western Province, *viz.*, Suriyamara, Hurimara, Rabalmara, and Madityamara. I suppose Aramana or Waya is also one of these species. The two former are very useful trees, both for cabinet and other purposes, and the rest are only used for building. Mora wood, referred to in your paper of the 28th instant, is not a cabinet wood, being very heavy. A cubic foot is said to weigh 62 lb. It is largely used as firewood in cremation and also for brick and lime kilns and is of a light brown colour.

A NATIVE.

[Our authority about Suriya-mara (Sinhalese), "Albizzia Lebbek" (of botanists) is the late Mr. Wm. Ferguson, F.L.S., who, writing in 1863, said :—"Wood brown, used for bullock bandies." Doubtless this timber was more plentiful then. Of "Suriya-gas" (Thespesia populnea—the tulip tree) the same authority reported :—"The best-known timber tree of the island, wood a shade between the colour of walnut and English elm; a tough, excellent wood used for felloes, naves and panels of carriages and for gun stocks."—ED, *T.A.*]

RAINBOW TROUT FOR EVERY STREAM IN CEYLON: GOVERNMENT SHOULD AID IN THEIR INTRODUCTION.

June 3.

SIR,—Now that it is an established fact that rainbow trout are breeding in Ceylon, would it be out of place to suggest to the Government that it might very graciously subsidise the Fishing Club liberally, so that trout may be introduced to every stream and river in Ceylon?

These trout can probably be acclimatised down to sea-level, and, if properly regulated and looked after, you can hardly imagine what a splendid food supply they would prove for the Colony, not to mention the grand sport for young and old.

Them's my sentiments. What do you think, Mr, Editor?—Yours,

PISCATOR.

II.

THE FACT ESTABLISHED BEYOND QUESTION.

Ceylon Fishing Club, Nuwara Eliya, June 2.

SIR,—I am requested by the Managing Committee of the Ceylon Fishing Club to inform you that there is now no doubt that rainbow trout are breeding in Ceylon—both in the Horton Plains and in the Nuwara Eliya streams. Mr. Farr has sent two small rainbow trout for inspection, that could only have been locally bred, whilst at least one tributary to the main Nuwara Eliya stream is swarming with rainbow fry, two members of the Fishing Club having caught and examined several varying in length from 2½ inches to 3½ inches.—Yours, &c.

J. WICKWAR, Hon. Secy,, C.F.C.

SOUTH AFRICA RECOMMENDED TO YOUNG MEN WITH A LITTLE CAPITAL.

June 3.

SIR,—I wrote you the other day that I heard the rustle of the wings of the Angel of Peace, and now the glorious Angel has appeared in all her smiling beauty, bearing a palm-branch in her hands. Lord Wolseley (then Sir Garnet) at the Vaal told the people that the country would remain English till the sun stood still in the heavens and the waters of the Vaal ran backwards. *Now* it will come true; but many dark days of blood and slaughter have come between. The struggle is ended, and all those farms and towns we saw devastated—deserted—ruined will again be peaceful happy homesteads around which the golden oranges, the soft peaches, and green fields will yield rich harvests. To show you the sad ruin war brings, I will give one instance. At Rustenberg I obtained leave to go through the town to get firewood (or anything else handy I could pick up.) I went along the street and approached the door of one of a line of pretty cottages and knocked. On the door was a paper beseeching any one who came to spare the property in the house. I knocked again. I heard heavy footsteps inside and went round to the back. There were a number of Tommies in there. They had gone through everything. It had been a comfortable, well-furnished house; but clocks, pictures, ornaments and furniture were lying on the floor, tossed about and trampled on. I went into the bed-rooms and there were all the paraphernalia of a lady's bed-room and toilet strewn on the floor. Articles of clothing, &c., &c., lying about. I went to the kitchen—in fact everywhere it was the same. One Tommy said, "There is little enough you will pick up. They have been through everything." This is only a sample of hundreds of houses we saw. One woman said they had been robbed by Boers and British by turns as they occupied the town.

And now to know that all this has ceased, that the country will begin to prosper and that there is room for thousands of British settlers to go and form happy homes in the veldt! Unlike Australia the veldt has everywhere a natural drainage and is undulating. Thus water can be tapped in the hollows; and many a grand stream of clear pure water we

saw flowing past farms which had been tapped from the hillside with comparatively little labour. I would recommend all youngmen in Ceylon, who have a little money, and who find their prospects in tea planting the reverse of promising, to go out to this country and gradually settle and participate in the coming prosperity that is near. Government will be most indulgent and liberal to all immigrants. With a powerful, wise and settled Government, and the presence of large numbers of hard-working British immigrants, the country will develop by leaps and bounds; and those who go there now will share in the coming prosperity. Though Peace has been declared, the Government will have a responsible task and large numbers of Police will have to be maintained, and regiments of soldiers in the chief towns, till matters gradually adjust themselves after the long war. Bitterness of feeling will gradually die out. TROOPER.

MOSQUITOS AND FLIES.

Colombo, June 5.

DEAR SIR,—We have not heard much about the experiments with kerosine oil and "chuloos" against lake flies, mosquitos *et hoc genus omne*. May I draw the attention of that august body, the Municipal Council of this city, to the remarks of an American paper (The *Public Health Journal*) with reference to a simple remedy for abating the mosquito nuisance, viz., permanganate of potash (in solution known as Condy's Fluid) which is said to kill the insect at any stage. To quote the journal itself: "a handful of permanganate will oxidise a ten-acre swamp, kill its embryo insects, and keep it free from organic matter for thirty days at a cost of 25 cents.* With care a whole State may be kept free of insects at a small cost, [and so might a small island like Ceylon]. An efficacious method is to scatter a few crystals widely apart. A single pinch of permanganate has killed all the germs in a 1,000 gallon tank." Will the Acting Sanitary Officer, who seems zealous of the good name of his department, put the alleged marvellous properties of permanganate of potash to the test and see if some benefit could be derived from the above remarks of the American Journal of Public Health?

Another matter, which will no doubt interest the Health Officer just at this time, when enteric is abroad, is the following statement which occurs in an article on the Entomology of the HouseFly, by the Government Entomologist at the Cape:—

"Numerous diseases, some of them most serious in character, may result from the visits of the fly to our food and our persons, for it often brings with it virulent germs from the fæcal or putrid matter which it has visited. It has been demonstrated thta the fly can contract plague from feeding on animals that have died of this disease, and that having contracted plague, it may live for several days and finally fall or drop dead on to food, meanwhile having been depositing excrement laden with virulent bacilli. It is firmly believed by medical men in India that cholera is very frequently transmitted by the house fly. Tuberculosis bacilli are taken up by it through feeding, as it often does, on the sputum of consumptive persons, and these germs are given off in the excreta. The excreta of flies that had been fed on infective sputum, when injected into rabbits, has given rise to tuberculosis. But of all diseases that it may transmit, typhoid or enteric fever probable ranks first in importance. The dejections of persons infected with this disease, it has been stated on the best of authority, harbour the causal organism not only during the period of actual illness, but for some days before and for some time after apparently complete recovery. The fly becomes contaminated by alighting on dejections that have not been properly disinfected, and then may carry the germs into surrounding households. The bacilli multiply rapidly in milk, and how easily can a fly render a whole pailful poisonous by falling into it or even simply sipping it! In cities and towns with good sewerage systems and well-enforced sanitary regulations, the carriage of typhoid by the fly is doubtless exceptional, but in concentration and army camps it is presumed to be very common."

Let us hope that before long we shall have n Colombo, such a Sewerage System and such Sanitary Regulations as those referred to above.—Yours truly, SANITAS.

*—Of a dollar—about 80 cents of our rupee.—ED, *T. A*

VOLCANIC DUST FROM BARBADOS.

MR. JOHN HUGHES' EXPERT ANALYSIS.

London, May 30.

DEAR SIR,—I enclose you a specimen and Photo-micrograph taken by my senior assistant, Mr. A Ashe, of the Volcanic dust, which, as the result of the eruption of Mount Soufrière in the island of St. Vincent, fell in such quantities in Barbados on the 6th of May and following days. The Dust is of a dark grey appearance, possessing a distinctly gritty character, though the largest particles probably do not exceed the size of a printer's full stop." When exhausted with a weak vegetable acid solution of a strength of one part Crystallised Citric Acid to 1,000 parts of cold distilled water, employing 1,000 parts of such solution to one part of the dust, and allowing 48 hours for exhaustion, there is only 2·60 per cent dissolved out and 97·40 still remains in an insolubl, form as Silicates of Iron and other Mineralse associated with Quartz. In the portion soluble in the above weak solution, Iron Compounds chiefly predominate, associated with small quantities of Calcium Sulphate, Potash, Salts and traces of Phosphoric Acid. Though not possessing any special fertilising value in itself, the dust by reason of its minute state of division will naturally improve the physical character of a soil such as that of Barbados, and it may reasonably be expected that the crops of sugar will under the influence of a suitable rainfall give an increased yield during the next two years at least, if not for a longer period. Under the microscope it will be seen that the dust consists of two classes of minerals, one being large and fairly uniform in size while the other consists of a very fine dust. Of the former a large proportion is black and opaque; whilst the transparent particles are partly white, such as Quartz associated with crystals tinged with green. The very fine dust appears to be composed almost entirely of Quartz. The dust when exhausted with a strong solution of Hydrochloric Acid (50 per cent Hcl) was dissolved to the extent of 14·45 per cent and contained ·39 Potash probably derived from Felspar, a common ingredient in igneous rocks.—Yours faithfully,

JOHN HUGHES, F.I.C.,
Agricultural Analyst.

SHARE LIST.

ISSUED BY THE

COLOMBO SHARE BROKERS' ASSOCIATION.

CEYLON PRODUCE COMPANIES.

Company	paid p. sh.	Buy-ers.	Sell-ers.	Tran-sactions.
Agra Ouvah Estates Co., Ltd.	500	...	850	—
Ceylon Tea and Coconut Estates	500	..	—	—
Castlereagh Tea Co., Ltd.	100	—	90	—
Ceylon Provincial Estates Co. Ltd.	500	505	..	—
Claremont Estates Co., Ltd.	100	—	—	—
Clunes Tea Co., Ltd.	100	...	50	—
Clyde Estates Co., Ltd.	100	—	—	—
Doomoo Tea Co., of Ceylon Ltd.	100	..	67½	...
Drayton Estate Co., Ltd.	100	—	..	—
Eila Tea Co., of Ceylon, Ltd.	100	—	25	—
Estates Co of Uva, Ltd.	500	..	205	—
Gangawatte Tea Co., Ltd.	100	—	—	—
Glasgow Estate Co., Ltd.	500	—	—	—
Great Western Tea Co., Ltd.	500	610	—	—
Hapugahalande Tea Estate Co.	200	125	—	—
High Forests Estates Co., Ltd	500	..	500	450
Do part paid	400	—	...	...
Horrekelley Estates Co Ltd	100	—	80	..
Kalutara Co., Ltd.,	500	—	175	...
Kandyan Hills Co., Ltd	100	—	40	—
Kanapediwatte Ltd.	100	—	50	..
Kelani Tea Garden Co., Ltd.	100	..	35	—
Kirklees Estate Co., Ltd.	100	50	—	...
Knavesmire Estates Co., Ltd.	100	...	45	—
Maha Uva Estates Co., Ltd.	500	—	350	...
Mocha Tea Co., of Ceylon, Ltd.	500	—	775	—
Nahavilla Estate Co., Ltd.	500	..	300	—
Nehrda Tea Co., Ltd.	500	—	...	—
Palmerston Tea Co., Ltd.	500	...	400	—
Penrhos Estates Co, Ltd.	100	—	75	—
Pitakanda Tea Company	500	—	...	—
Pine Hill Estate Co., Ltd.	60	...	40	—
Putupaula Tea Co., Ltd.	100	...	..	—
Ratwatte Cocoa Co., Ltd.	500	..	—	—
Rayigam Tea Co., Ltd.	100	...	40	—
Roeberry Tea Co., Ltd.	100	—	85	—
Ruanwella Tea Co., Ltd.	100	...	30	—
St. Heliers Tea Co., Ltd,	500	...	—	—
Talgaswela Tea Co., Ltd.	100	20	—	—
Do 7 per cent Prefs.	100	..	—	...
Tonacombe Estate Co., Ltd,	500	..	...	...
Udugama Tea & Timber Co., Ltd.	50	...	...	...
Union Estate Co., Ltd.	500	..	110	—
Upper Maskeliya Estates Co., Ltd.	500	..	—	—
Uvakellie Tea Co., of Ceylon, Ltd	100	...	—	—
Vogan Tea Co., Ltd.,	100	42½	—	40
Wanarajah Tea Co., Ltd.	500	..	900	—
Yataderiya Tea Co., Ltd.	100	—	235	..

CEYLON COMMERCIAL COMPANIES

Company	paid p. sh.	Buy-ers.	Sell-ers.	Tran-sactions.
Adam's Peak Hotel Co., Ltd.	100	...	80	—
Bristol Hotel Co., Ltd.	100	100	—	100
Do 7 per cent Debts	100	107	—	—
Ceylon Gen. Steam Navigation Co., Ltd	100	210	...	—
Ceylon Ice & Cold Storage Co. Ltd.	100	—	115	..
Ceylon Superæration Ltd.	100	—	40	—
Colombo Apothecaries' Co. Ltd.	100	—	135	132½
Colombo Assembly Rooms Co., Ltd.	20	15	..	—
Do prefs.	20	...	..	—
Colombo Fort Land and Building Co., Ltd.	100	—	85	80
Colombo Hotels Company	100	—	...	280
Galle Face Hotel Co., Ltd.	100	—	195	—
Kandy Hotels Co., Ltd.	100	..	135	—
Kaluganga Nav. Co. Ltd.	60	...	—	50
Mount Lavinia Hotel Co., Ltd.	500	—	300	—
New Colombo Ice Co., Ltd.	100	..	125	—
Nuwara Eliya Hotels Co., Ltd.	30	30	—	...
Do 7 per cent prefs.	100	—	115	—
Public Hall Co., Ltd.	20	...	—	10

LONDON COMPANIES

Company	paid. p. sh.	Buy-ers.	Sell-ers.	Tran-saction.
Alliance Tea Co., of Ceylon, Ltd.	10	..	8—9	—
Anglo-Ceylon General Estates Co	100	...	55—60	—
Associated Estates Co., of Ceylon	10	..	1½—2½	—
Do. 6 per cent prefs	10	..	3—5	—
Ceylon Proprietary Co.	1	.	¼—½	—
Ceylon Tea Plantation Co., Ltd.	10	..	23¼—24	—
Dimbula Valley Co., Ltd.	5	..	5—5½	—
Do prefs	5	—	5—6	—
Eastern Produce & Estates Co. Ltd.	5	...	3¼—3¾	—
Ederapolla Tea Co., Ltd	10	...	6—8	—
Imperial Tea Estates Co., Ltd.	10	...	4 4½	—
Kelani Valley Tea Asscn., Ltd.	5	...	3—5	—
Kintyre Estates Co., Ltd.	10	...	6—8	—
Lanka Plantations Co., Ltd	10	..	4	—
Nahalma Estates Co., Ltd.	1	...	nom	..
New Dimbula Co., Ltd.	1	...	2¾—3	..
Nuwara Eliya Tea Estate Co., Ld.	10	—	9¾	—
Ouvah Coffee Co., Ltd.	10	..	6—7	—
Ragalla Tea Estates Co., Ltd.	10	.	11—13	—
Scottish Ceylon Tea Co., Ltd.	10	.	10—15	—
Spring Valley Tea Co., Ltd.	10	...	2—5	—
Standard Tea Co., Ltd.	6	..	10—	..
The Shell Transport and Trading Company, Ltd.	1	...	2⅞—3⅛	... —
Ukuwella Estates Co., Ltd.	2F	—	par	...
Yatiyantota Ceylon Tea Co., Ltd.	10	—	5¼	..
Do. pref. 6 o/o	10	..	9—10	...

BY ORDER OF THE COMMITTEE.

Colombo, July 4th, 1902.

* Latest London Prices

RAINFALL RETURN FOR COLOMBO.

(*Supplied by the Surveyor-General.*)

	1897.	1898.	1899.	1900	Av of 32yrs.	1901	1902
	Inch	Inch	Inch.	Inch.	Inch.	Inch.	Inch
January ..	3·81	2·32	6·98	3·72	3·24	11·91	1·95
February ..	1·68	1·98	2·78	0·63	1·89	3·55	4·57
March ..	3·66	4·21	0·88	3·71	4·75	5·12	6·85
April ..	10·97	22·81	6·66	15·12	11·43	8·71	10·01
May ..	8·30	5·80	17·73	10·63	12·04	6·28	11·89
June ..	10·14	10·94	9·23	7·83	8·35	5·93	9·84
July ..	5·24	6·15	1·11	6·77	4·30	4·52	0·91*
August ..	9·09	0·97	0·62	7·35	3·79	0·46	
September ..	4·58	6·90	1·48	4·00	4·98	3·93	
October ...	4·71	20·60	12·99	9·47	14·36	3·01	
November ..	11·66	17·38	8·58	9·25	12·55	19·84	
December ..	8·89	3·05	4·44	5·20	6·35	1·70	
Total..	82·73	103·11	73·48	83·68	88·03	75·86	46·02

* From 1st to 3rd July 0.91 inch, that is up to 9-30 a.m. on the 4th July.—ED. *C.O.*

CEYLON TEA: MONTHLY SHIPMENTS TO UNITED KINGDOM AND ESTIMATE.

Estimate for June 1902—12½ to 13 mil. lb.
Total Shipments Do 1902—13 mil. lb.
Do Do Do 1901—11,425,044 lb.
Do Do Do 1900—12,151,886 lb.
[ESTIMATE for July 1902—9½ to 10 million lb.]

THE DEAF HEAR.—No. 479 of *the Illustrated World* of 626, Chiswick High Road, London, W., England contains a description of a remarkable Cure for Deafness and Head Noises which may be carried out at the patient's home, and which is said to be a certain cure. This number will be sent free to any deaf persons sending their address to the Editor.

COLOMBO PRICE CURRENT.

(Furnished by the Chamber of Commerce.)

EXPORTS

Colombo, June 30th, 1902.

CARDAMOMS :—
All round parcel, well bleached per lb. R1·10
Do. dull medium do. R0·90
Special assortment, 0 and 1 only do. R1·25
Seeds do. R1·00

CINCHONA BARK :—
Per unit of Sulphate of Quinine 8c—1½ to 3 per cent.

CINNAMON :—(in bales of 100 lbs. nett.)
Ordinary assortment per lb. 52c.
Nos. 1 and 2 only per lb. 58c,
Nos. 3 and 4 only per lb. 46c.

CINNAMON CHIPS :—(in bgs. of 56 lbs. nett. per candy of 560 lbs.)
Per candy of 560 lb R70·00

COCOA :—
Finest estate red; unpicked per cwt R45·00 }
Medium do do do R38·00 } Nominal
Bright native unpicked and undried R37·00 } Local supplies
Ordinary do do do R28·00 } scarce

COCONUTS—(husked).
Selected per thousand R53·00
Ordinary ,, R43·00
Smalls ,, R39·00

COCONUT CAKE—
Poonac in robins f. o. b. per ton R80·00
Do in bags none.

COCONUT (Desiccated).
Assorted all grades per lb 0c

COCONUT OIL—
Dealers' Oil per cwt R18·00.
Coconut Oil in ordinary packages f. o. b. per ton R395·00.—Sales at both rates.

COFFEE.—
Plantation Estate Parchment on the spot per bus. None
Plantation Estate Coffee f. o. b. (ready) per cwt.—None.
Native Coffee, f.o.b per cwt.—None.

CITRONELLA OIL—
Ready do per lb.—47c Steady.

COPRA—
Boat Copra per candy of 560 lb. R58·00
Calpentyn Copra do do R58 00
Cart do do do R53·00
Estate do do do R57·00

CROTON SEED per cwt—R11·00

EBONY—
Sound per ton at Govt. depot—R180·00.—Next sales fixed for 4th August.
Inferior R90·00.—Next sales fixed for 4th August.

FIBRES—
Coconut Bristle No 1 per cwt None
Do ,, 2 None
Do mattress ,, 1 None
Do ,, 2 None
Coir Yarn, Kogalla ,, 1 to 8 15·00
Do Colombo ,, 1 to 8 R11·00.—Fine qualities steady, others lower.
Kitool all sizes None
Palmyrah None

PEPPER—Black per lb None

PLUMBAGO—
Large lumps per ton R650
Ordinary lumps do R625 Fine qualities scarce, but an easier tendency.
Chips do R425
Dust do R275
Do (Flying) do R150

SAPANWOOD— per ton R40·00
SATINWOOD (ordinary) per cubic ft. R4·00
Do (Flowered) per cubic ft. R17·00

TEA—	High Grown Average	Medium Average.	Low Grown Average.
Broken Pekoe and Broken	cts	cts	cts
Orange Pekoe per lb	49	39	30
Orange Pekoe do	33	35	27
Pekoe do	32	36	26
Pekoe Souchong do	30	25	24
Pekoe Fannings do	28	27	27
Broken mixed—dust, &c	27	24	25

CEYLON EXPORTS AND DISTRIBUTIO FOR SEASONS 1901 AND 1902.

COUNTRIES	Black Tea. 1902 lbs.	Black Tea. 1901 lbs.	Green Tea. 1902 lbs.	Green Tea. 1901 lbs.	Coffee—cwts. Plantation	Coffee—cwts. N'tive	Coffee—cwts. Total	Cocoa cwts.	C'moms lbs.
To U K.	52512[illegible]16	55819101	253571	93449	3058	..	3058	17559	182854
,, Austria	11478	2[illegible]100	..	..	1	..	1	...	...
,, Belgium	34353	8666	...	..	54	..	54	475	...
,, France	10479	1[illegible]8927	...	..	2	...	2	379	448
,, Germany	191112	193021	...	..	23	..	23	2509	74344
,, Holland	3190	15489	...	..	...	..	..	..	..
,, Italy	5619	7711	.	..	...	..	..	32	435
,, Russia	4736502	4769103	106435	..	8	...	8	...	448
,, Spain	3281	...	..	..	...	..	..	..	..
,, Sweden	39173	26474	...	..	..	..	..	400	...
,, Turkey	16423	24822	..		...	...	..	..	..
,, India	316695	665108	14031	15093	63	...	63	1	44912
,, Australia	8820816	10225870	..	...	1740	14	1754	311	...
,, America	2182048	1175172	372595	314703	820	...	820	...	2326
,, Africa	274163	152386	1200	..	4	..	4	..	[illegible]226
,, China	1662871	1506530	...	4450	16	..	16	100	5745
,, Singapore	75896	73923	...	...	1	...	1	4321	400
,, Mauritius	44960	15330	..	...	108	..	108	..	..
,, Malta	181881	161433	..	...	...	...	..	...	...
Total export from 1st Jan to 30th June 1902	710175[illegible]7	75014166	747832	427695	5898	14	5912	26090	314138

COUNTRIES	Cinnamon Bales. lbs.	Cinnamon Chips. lbs.	Coconut Oil. 1902 cwt	Coconut Oil. 1901 cwts	Copra cwts.	Desiccated Coconut lb.	Poonac. cwts.	Coconuts. No.	Plumbago. 1902 cwts	Plumbago. 1901 cwts.
To U K.	151524	82231	93343	92462	9708	3612549	21	6264405	80618	71889
,, Austria	5600	36400	2987	1178	...	49400	...	5000	...	..
,, Belgium	46000	66640	1396	2495	4903	92070	34505	78040	5006	7130
,, France	28200	5600	238	..	3 530	14000	...	56020	..	186
,, Germany	281581	303634	4464	903	43942	683400	32947	520830	29774	21514
,, Holland	17000	124600	..	..	..	100620	..	..	203	...
,, Italy	49100	75992	1310	499	...	...	10	9110	..	...
,, Russia	130	..	...	..	21036	..	..	...	1546	3595
,, Spain	86800	26100	..	..	...	..	..	...	...	...
,, Sweden	..	..	617	199	...	..	..	..	206	...
,, Turkey	..	...	...	...	..	...	...	..	..	...
,, India	...	2296	33081	35909	...	...	...	19100	1582	1[illegible]8
,, Australia	2924	14648	.	94	...	265930	21	..	89	13[illegible]
,, America	80000	4315	30313	7007	...	732095	...	...	144983	82333
,, Africa	..	..	60	76	..	17300	1	589381	...	...
,, China	200	112	319	707	..	...	..	..	797	..
,, Singapore	...	...	20	...	...	...	...	...	...	...
,, Mauritius	..	..	...	..	...	..	..	..	..	..
,, Malta	...	..	..	..	..	...	..	..	...	..
Total export from 1st Jan to 30th June 1902	749059	742618	168148	141529	115119	5565364	67505	7542186	264804	187437

MARKET RATES FOR OLD AND NEW PRODUCTS.

(From Lewis & Peat's Fortnightly Price Current, London, June 18th, 1902.)

	QUALITY.	QUOTATIONS.
ALOES, Soccotrine cwt.	Fair to fine dry ..	70s a 80s
Zanzibar & Hepatic ,,	Common to good ..	20s a 60s
ARROWROOT (Natal) lb.	Fair to fine ..	7d a 8d
BEES' WAX, cwt.		
Zanzibar & Bombay { White ,,	Good to fine	£6 a £7 10s
Yellow ,,	Fair ,,	£6 a £7 5s
Madagascar ,,	Dark to good palish	£6 15s a £7 10s
CAMPHOR, Formosa ,,	Crude and semi-refined	16 s a 180s
Japan ,,	Fair average quality ..	17(s
CARDAMOMS, Malabar lb	Clipped, bold, bright, fine	1s 9d a 2s
	Middling, stalky & lean	1s a 1s 7d
Ceylon.—Mysore ,,	Fair to fine plump ..	1s a 3s
	Seeds ..	1s 3d a 1s 7d
,, Tellicherry ,,	Good to fine ..	1s 6d a 2s
	Brownish ..	1s 3d a 1s 6d
,, Long ,,	Shelly to good ..	9d a 2s 9d
,, Mangalore ,,	Med brown to good bold	2s 3d a 3s 3d
CASTOR OIL, Calcutta ,,	1sts and 2nds ..	2⅝d a 2⅞d
CHILLIES, Zanzibar cwt.	Dull to fine bright ...	3?s 6d a 4?s
CINCHONA BARK.—lb. Ceylon	Ledgeriana Orig. Stem	6d a 9d
	Crown, Renewed	5d a 7d
	Org. Stem	3½d a 7d
	Red Org. Stem	3⅜d a 4¼d
	Renewed	3d a 5¾d
	Root	3¾d a 4d
CINNAMON, Ceylon 1sts per lb.	Ordinary to fine quill	8½d a 1s 6d
2nds	,, ,,	9d a 1s 6d
3rds	,, ,,	7½d a 1s 4d
4ths	,, ,,	7d a 11d
Chips	,, ,,	2½d a 10d
CLOVES, Penang lb.	Dull to fine bright bold	5½d a 1s
Amboyna ..	Dull to fine	4½d a 6d
Zanzibar and Pemba }	Good and fine bright	3 13-16d a 4¼d
	Common dull to fair	3⅜d a 3¾d
Stems ..	Fair	1d
COFFEE		
Ceylon Plantation ,,	Bold to fine bold colory	92s 6d a 120s
	Middling to fine mid ..	80s a 106s
	Smalls	40s a 60s
Native	Good ordinary	40s a 55s
Liberian ,,	Small to bold	30s a 40s
COCOA, Ceylon ,,	Bold to fine bold	66s a 80s
	Medium and fair	58s a 65s
	Native	49s a 60s
COLOMBO ROOT ,,	Middling to good	8s a 13s
COIR ROPE, Ceylon ton		nominal
Cochin ,,	Ordinary to fair ..	£13 10s a £18
FIBRE, Brush ,,	Ord. to fine long straight	£16 a £19
Cochin ,,	Ordinary to good clean	£20 a £24
Stuffing ,,	Common to fine	£7 a £9
COIR YARN, Ceylon ,,	Common to superior	£15 a £30
Cochin ,,	,, ,, very fine	£12 a £32
do. ,,	Roping, fair to good	£10 a £14 10s
CROTON SEEDS, sift. cwt.	Dull to fair	15s a 25s
CUTCH ,, ,,	Fair to fine dry	23s a 35s
GINGER, Bengal, rough ,,	Fair	40s
Calicut, Cut A ,,	Good to fine bold	80s a 90s
B & C ,,	Small and medium	48s a 70s
Cochin Rough ,,	Common to fine bold	35s a 40s
	Small and D's	34s a 38s
Japan ,,	Unsplit	32s a 34s
GUM AMMONIACUM ,,	Sm. blocky to fine clean	10s a 35s
ANIMI, Zanzibar ,,	Picked fine pale in sorts	£10 7s 6d a £18
	Part yellow and mixed	£7 a £9
	Bean and Pea size ditto	70s a £9 2s 6d
	Amber and dk. red bold	£5 15s a £8
	Med. & bold glassy sorts	90s a £7 17s 6d
Madagascar ,,	Fair to good palish ...	£4 a £8
	,, ,, red ..	£4 5s a £7 10s
ARABIC E. I. & Aden ,,	Ordinary to good pale	25s a 40s
Turkey sorts ,,		3?s a 37s 6d
Ghatti ,,	Pickings to fine pale ...	10s a 21s
Kurrachee ,,	Good and fine pale ...	27s 6d a 30s
	Reddish to pale selected	10s a 25s
Madras ,,	Dark to fine pale ...	18s a 25s
ASSAFŒTIDA ,,	Clean fr to gd. almonds	45s a 75s
	Ord. stony and blocky	9s a 30s
KINO ,,	Fine bright	6d a 9d
MYRRH, picked ,,	Fair to fine pale	80s a 120s
Aden sorts ,,	Middling to good	50s a 70s
OLIBANUM, drop ,,	Good to fine white	4?s a 46s
	Middling to fair	28s a 42s 6d
pickings ,,	Low to good pale	20s a 26s 6d
siftings ,,	Slightly foul to fine	18s a 23s
INDIARUBBER, Ceylon	Fine (grwn. fr. Para seed)	2s 3d a 3s 6¾d
Assam	Good to fine	2s a 2s 3d
	Common to foul & mxd.	7d a 1s 6d
Rangoon	Fair to good clean ...	2s a 2s 4d
Borneo	Common to fine	6d a 1s 9d

	QUALITY.	QUOTATIONS.
INDIARUBBER (Contd.)		
Java, Sing. & Penang lb.	Foul to good clean ..	8d a 2s 1d
Mozambique ,,	Good to fine Ball ...	2s 6d a 2s 9d
	Ordinary to fair Ball ...	1s 10d a 2s 2d
	Low sandy Ball ...	9d a 1s 6d
	Sausage, fair to good ..	1s 10d a 2s 6½d
	Liver and Livery Ball ..	1s 9d a 2s 6½d
Nyassaland	Fair to fine ball ..	2s 3d a 2s 8d
Madagascar	Fr to fine pinky & white	2s a 2s 5½d
	Fair to good black ..	1s 3d a 1s 9d
	Niggers, low to fine .	7d a 2s
INDIGO, E.I.	Bengal—	
	Shipping mid to gd violet	3s 4d a 3s 8d
	Consuming mid. to gd.	2s 10d a 3s 2d
	Ordinary to mid.	2s 6d a 2s 10d
	Mid. to good Kurpah	1s 6d a 2s
	Low to ordinary	9d a 1s 3d
	Mid. to good Madra	1s 9d a 2s 2d
MACE, Bombay & Penang per lb.	Pale reddish to fine	2s a 3s
	Ordinary to fair	1s 4d a 1s 11d
	Pickings	1s 3d a 1s 4d
MYRABOLANS, Madras } cwt	Dark to fine pale UG	5s a 6s
	Fair Coast	4s 6d a 5s
Bombay ,,	Jubblepore	4s 6d a 5s 6d
	Bhimlies	4s a 6s
	Rhajpore, &c.	3s 6d a 5s 6d
Bengal ,,	Calcutta	3s 6d a 5s
NUTMEGS— lb.	64's to 57's	2s 6d
Bombay & Penang ,,	110's to 65's	1s 1d a 2s 5½d
	160's to 115's	6d a 1s
NUTS, ARECA cwt.	Ordinary to fair fresh	14s a 18s
NUX VOMICA, Bombay	Ordinary to middling	5s 6d a 6s
per cwt. Madras	Fair to good bold fresh	7s a 10s
	Small ordinary and fair	5s a 6s 9d
OIL OF ANISEED ,,	Fair merchantable	4s 3d
CASSIA ,,	According to analysis	2s 1d a 2s 6d
LEMONGRASS ,,	Good flavour & colour	5½d
NUTMEG ,,	Dingy to white	1½d a 3d
CINNAMON ,,	Ordinary to fair sweet	3¼d a 1s 3d
CITRONELLE ,,	Bright & good flavour	9½d a 10d
ORCHELLA WEED—cwt		
Ceylon ,,	Mid. to fine not woody..	10s a 12s 6d
Zanzibar. ,,	Picked clean flat leaf ..	10s a 14s
	,, wiry Mozambique	10s a 11s
PEPPER - (Black) lb.		
Alleppee & Tellicherry	Fair to bold heavy ..	5¼d a 5½d
Singapore ...	Fair	5 9-16d
Acheen & W. C. Penang	Dull to fine	4¾d a 5¼d
PLUMBAGO, lump cwt.	Fair to fine bright bold	30s a 35s
	Middling to good small	20s a 28s
chips	Dull to fine bright ..	9s a 15s
dust	Ordinary to fine bright	4s a 7s 6d
SAFFLOWER	Good to fine pinky ..	65s a 75s
	Inferior to fair ..	40s a 60s
SANDAL WOOD—		
Bombay, Logs ton.	Fair to fine flavour ..	£15 a £30
Chips ,,	... ...	£5 a £8
Madras, Logs ,,	Fair to good flavour ..	£15 a £30
Chips ,,	Inferior to fine ...	£4 a £8
SAPANWOOD Ceylon ,,	Fair to good ..	£5 a £5 10s
Manila ,,	{ Rough & rooty to good	£4 10s a £5 15s
Siam ,,	{ bold smooth ...	£7
SEEDLAC cwt.	Ord. dusty to gd. soluble	115s a 120s
SENNA, Tinnevelly lb	Good to fine bold green	5d a 8d
	Fair greenish	3½d a 4d
	Common dark and small	½d a 3d
SHELLS, M. o'PEARL—		
Bombay cwt.	Bold and A's }	£1 a £5
	D's and B's }	
	Small ... }	
Mergui ,,	Small to bold ..	£7 7s 6d a £9 15s
Mussel ,,	Small to bold. ...	22s a 60s
TAMARINDS, Calcutta...	Mid. to fine bl'k not stony	8s a 10s
per cwt. Madras	Stony and inferior ..	4s 6d a 6s
TORTOISESHELL—		
Zanzibar & Bombay lb.	Small to bold dark mottle part heavy }	17s a 23s 6d
TURMERIC, Bengal cwt.	Fair ...	14s a 16s
Madras ,,	Finger fair to fine bold bright	12s 6d a 16s
Do. ,,	Bulbs ..	1?s a 1?s
Cochin ,,	Finger ..	11s a 14s
	Bulbs ...	9s a 9 6d
VANILLOES— lb.		
Mauritius .. } 1sts	Gd. crysallized 3½ a 9 in	6s 6d a 22s 6d
Bourbon ... } 2nds	Foxy & reddish 3½ a 8 ,,	5s a 15s
Seychelles 3rds	Lean and inferior ...	3s a 7s 9d
VERMILION lb.	Fine, pure, bright ...	3s 1d a 3s 2d
WAX, Japan, squares cwt	Good white hard ...	43s 6d

THE

AGRICULTURAL MAGAZINE,

COLOMBO.

Added as a Supplement Monthly to the "TROPICAL AGRICULTURIST."

The following pages include the Contents of the *Agricultural Magazine* for July :—

Vol. XIV] JULY, 1902. [No. 1.

OURSELVES.

THE *Agricultural Magazine* has rounded off another year of its existence, and with the present issue appears the first number of Volume XIV. Of modest aspirations the little periodical has, we venture to think, done good work, and that it is appreciated is evidenced by the many applications we have received for special numbers from those who are not regular subscribers Through the Magazine as an exchange, we have been enabled to keep in touch with the agricultural literature of other countries, and to the Editors of foreign Journals we owe much thanks for their liberal co-operation in the cause of agricultural advancement. We have also to thank our subscribers, both local and foreign, for the support we have received during the past year.

CLOSE PLANTING.

There is little doubt that one of the unfortunate tendencies in planting, and particularly in the cultivation of perennial crops, is planting too close. The manner in which trees are crowded together in native gardens where sunlight and air are to a great extent kept away from most of the foliage, and almost altogether from the stems and roots of crops, is often spoken of with scorn and ridicule, but are we sure that we are growing our coconuts, for instance, to the best advantage when we plant 75 trees to the acre? The advantages of reducing the number of trees per acre have before now been discussed by correspondents in our columns, and we fancy that there is a tendency—slow but sure—towards increasing the distance between the trees on coconut plantations. The idea of getting the most out of one's land by occupying it as fully as possible is difficult to get over, and there are a large number of growers who have yet to be persuaded that this is false economy, and that the liberal treatment of trees in the matter of air and light is reciprocated in a measure that leaves no doubt as to the wisdom of such treatment.

A cocoa planter of long experience lately stated to us that if he had to plant an estate again he would not place his trees less than 20 feet apart. Many will smile at the decision, and say that there is no necessity for doing so, as the cocoa tree does not develope to the space provided by such a system of planting. The truth is that it does not because it has not the opportunity. Give it the chance and it will. The extreme artificial conditions of plant life under cultivation are in a great measure answerable for the trouble that has followed the cultivator, who is generally set on making what he thinks the most of his resources with a thought only for the present and none for the future.

The latest illustration of the advantages to be gained by a more liberal system of cultivation—liberal as regards the natural environments of plant life, so as to produce the fittest individuals without the struggle for existence—is the experience with regard to coffee cultivated according to what is called the Leeming system, which

is no more than the rational system, or, as Dr. Watt is reported to have termed it, the correct scientific system. What Mr. Leeming has done is what every other grower of "fruits" might have done before him, viz., he thought out and applied to coffee growing the principles carried out by practical and scientific growers of fruit trees in various parts of the world. Large cultivators are too apt to look upon and treat their estates as a composite mass without sufficiently recognizing the claims and requirements of trees as individual living organisms. We need not here refer to the various elements that go to secure the benefits resulting from what some are pleased to call "intensive cultivation": we are only concerned with the necessity for giving room—air space and ground space—for the full developement of trees, without which there must always be limits to developement which the most liberal treatment in other respects cannot extend.

We read with regard to the Leeming system of coffee culture that the crops were increased enormously by the removal of more than half the bushes and proper attention given to the balance. To quote the *Indian Agriculturist*:—"Mr. Leeming has cut out his trees from 6 feet to 8 feet, and from 8 feet to 12 feet, and the further apart the trees are grown, the better he finds the yield in quality and quantity." Those who are interested in the details of cultivation should consult the proceedings of the United Planters' Association of Southern India for 1901, but we would now only point to that one important condition which, when attended to, would appear to allow not only scope for the developement of the trees, but scope also for the ingenuity of the planter and for the possibilities of more successful and remunerative cultivation.

OCCASIONAL NOTES.

"Cocoa and its Adulteration" by an "Expert" will be found instructive and racy reading, and should, if printed in the form of a "Circular," appeal to the convictions of many with whom cocoa is now only a casual beverage. Before long, we have no doubt,the economical householder will discover that cocoa, unlike tea, is not merely a dilutent of sweetened milk, but in itself a nutritious food. The infusion of tea leaves will do for the better-off to sip to their heart's content, but those who possess a moderate-sized purse and wish to get their money's worth of nutriment, will very soon take to buying pure cocoa where it can be had at reasonable rates.

The dressing of the horse's hoof is a matter of interest to many. We give below the views of Mr. A. Chinniah, Veterinary Surgeon, on the subject. "Covering the hoof with tar is a pernicious practice which has taken deep root in most stables in Ceylon. Tar gives a mechanical and impermeable coating, and is no doubt favoured on account of its cheapness. Tar, as we know, is used as a protective agent against the action of air on iron, &c., and thus prevents oxidation. Now the wall of the hoof is not dead tissue, and though hard in consistency, it is thin and protects very sensitive tissue, not merely against concussion but against excessive heat and cold and other atmospheric changes. When tar is applied, it effectually keeps out air, with the ultimate result of 'brittle hoof.' All that is wanted is a good dry stable and an attentive syce. As a protective substance any bland oil may be used. When tar is recommended by some as a hoof dressing, it is no doubt intended to be applied not to the walls of the hoof but the sole surface (and that with discretion), viz., the frog, bars, cleft, &c. But this is only necessary where a number of animals are kept (as in omnibus stables) under the care of one man; it is out of place in a private stable. There are many hoof dressings on the market, but the one commonly in use in Ceylon is Stockholm tar and fish oil, which is often seen forming a thick layer over the hoof, when this 'finger nail,' as it indeed is, should appear in its natural beauty."

The Director of the Royal Botanic Gardens accompanied by the Director of Public Instruction and the Superintendent of School Gardens inspected some of the School Gardens in the Western Province on the 18th June.

We observe with much regret that there is a possibility of the company of which Mr. E. Elliott is Manager being wound up. In India, we read, agricultural farming is just being taken up by Europeans, and that a Mr. Wilde has obtained a grant of 1,000 acres of waste land in the Darrang district on a 30 years' lease, and will devote his attention to mixed farming, cultivating commercial crops, such as oil-seeds, flax, jute, aloes, &c.

The following note from the *Veterinary Journal* for June will doubtless prove of interest to the authorities in control of the Harrasbedde Breeding Farm, where hitherto the lambs born have all turned out to be males!

Working on the hypothesis that sex is determined by the influence of the more vigorous parent, M. Dechambre gives the following observations. He deduced from the hypothesis that in a lambing season the influence of the male might be predominant at the beginning, and that of the female towards the end. M. Dechambre examined three flocks, and found that out of 1,065 lambs 519 were male and 546 female. Dividing the season of copulation into two portions he found:—

First	half, for evey	100	males	96·6	females.
Second	,,	,,	100	,,	117	,,

Dividing the season into three portions he found—

First	third, for every	100	males	89·6	females.
Second	,,	,,	100	,,	119	,,
Third	,,	,,	100	,,	125	,,

Dividing the season into four portions he found—

First	quarter, for every	100	males	84·3	females.
Second	,,	,,	100	,,	107·3	,,
Third	,,	,,	100	,,	109·3	,,
Fourth	,,	,,	100	,,	146·3	,,

It will thus be seen that at the beginning of the copulative period male lambs were in the majority, but the females soon made up on them, and at the end formed a distinct majority. M. Dech-

ambre does not lay too much stress on these results, and says that a great number of observations are necessary before any reliable data can be found.

The subject of castration is one concerning which we have often had enquiries, and about which there is much misconception. We have therefore taken over from the last Veterinary Journal a reliable, clear and full account of the operation, which we have no doubt will prove useful to our readers.

RAINFALL TAKEN AT THE SCHOOL OF AGRICULTURE DURING THE MONTH OF JUNE, 1902.

1	Sunday ..	1·06	17	Tuesday ..	Nil
2	Monday ...	Nil	18	Wednesday	Nil
3	Tuesday ...	·02	19	Thursday ..	Nil
4	Wednesday ..	·85	20	Friday ...	2·90
5	Thursday ...	·03	21	Saturday ..	Nil
6	Friday ...	·14	22	Sunday ...	Nil
7	Saturday ..	Nil	23	Monday ...	·20
8	Sunday ..	Nil	24	Tuesday ...	Nil
9	Monday ...	Nil	25	Wednesday	Nil
10	Tuesday ...	Nil	26	Thursday ...	·95
11	Wednesday ...	·12	27	Friday ...	·22
12	Thursday ...	·9	28	Saturday ..	·20
13	Friday ...	·14	29	Sunday ..	·62
14	Saturday ..	·10	30	Monday ...	1 02
15	Sunday ...	Nil	1	Tuesday ...	·06
16	Monday ..	Nil			
				Total...	7·36
				Mean...	·25

Greatest amount of rainfall registered in 24 hours, on the 20th Friday 1902, 2·90 inches.

CLUB-ROOT.

We were sorry to find on a recent visit to the Nuwara Eliya district that the cultivation of Cabbages was being greatly checked by the prevalence of this troublesome disease, about which we append the following note for the information of our readers:—

Club-root in Turnips, Cabbages, Cauliflowers, Rape and other cruciferous crops is the name given to the malformation of the roots. When pulled the main root is found to be much dwarfed, while the side roots are often swollen into spindle-shaped masses, presenting an appearance to which the name of finger-and-toe is appropriately applied. Lumps or nodules may also be seen upon the roots. A crop thus affected ultimately perishes, owing to the decay of the roots.

This disorder—whether called club-root, finger-and-toe or "anbury"—must not be confounded with a malformation of the root which occasionally arises as a result of some peculiarity of the soil, seed or manure, and is really a case of degeneration or "reversion" to the wild type. In such cases the growth though distorted is nevertheless healthy, but in club-root it is only necessary to cut across the root to see that it is full of decaying matter.

Nor, again, should the wart-like growths formed upon the roots by the small beetle termed the turnip-gall weevil be mistaken for clubbing. By cutting across such galls on the roots of turnips and cabbages the legless "maggots" of the insect may be found.

True Club-root is always associated with the presence of a slimy fungus known as *Plasmodiophora Brassica.*

The spores of the organism are very minute, and they not only attack and destroy cruciferous crops, but they infest the soil to such an extent that it is unwise to grow such crops on the same land again for several years. A spore existing in the soil finds its way into a cruciferous plant through a root-hair, and at once makes a demand upon the protoplasm of the plant. The spores produce slimy masses called *plasmodia*, and these have a slight power of locomotion from cell to cell of the infested plant.

The refuse of the diseased crop should not be left on the ground or thrown about in the neighbourhood of the garden, as it is capable of serving as a new source of infection. Dressing the land with lime—and especially gas-lime—tends to destroy the spores in the soil. Therefore, burn all crop refuse and diseased plants and thoroughly cleanse the soil of spores by using gas lime, or, in its absence, caustic lime, before replanting an infected area.

SODIUM ARSENITE AS A PLANT DESTROYER.

Some time ago we published a note with reference to the efficacy of this chemical in eradicating Prickly Pear and other plant pests, and received a communication from a leading coconut planter, who is nothing if he is not up-to-date, asking us to procure for him a small quantity of the arsenite for purposes of experiment. This we have been able to do, and in order to give some idea of how the chemical has been used in other countries, we append a description of the method of mixing, applying, &c.

There is no doubt that many plants can be similarly treated, but it is questionable whether "Iluk" (*Imperata arundinacea*), which is truly the "planter's curse" will succumb to the destructive agent, unless liberal application of the solution, so as to reach the roots, be made.

Here is an account of how it was used against Prickly Pear, the native "Katupathok."

Making the Solution.—8 lb. of the chemical was first weighed off and placed in a kerosene can or old bucket; to this was added 2 gals. water, and it was then placed on a fire and heated until the chemical was quite dissolved, the operator stirring it occasionally. The 80 gal. vat nearly filled with cold water, and the 2 gals. of solution then poured in, and more water added to make up to 80 gals. One great advantage in using sodium arsenite is that it dissolves easily, and therefore no trouble occurs from pumps or spray nozzles becoming choked, which is so often the case with many solutions used.

Method of Application.—For applying the solution a powerful "Doncaster" spray pump was used. This was mounted on an 80 gal. vat and placed in a light cart drawn by a single horse. Two lengths of hose were attached and connected with nozzles mounted on light iron pipes, so that two sprays were working at once; and by means of the pipes the spray could be got over the top of the tallest plants. It takes one man and two boys (or three boys would do) to carry out the work. *i.e.*, one to work the pump and drive the horse, and two to apply the spray. With this plant there is no difficulty in spraying an acre of thickly-infested pear land per day, and, generally, as the land is rarely thickly covered, some few acres per day could be sprayed.

Time to apply.—The experiments extended over two years, and as they were conducted at regular intervals, a good opinion could be formed as to the best time to spray. It appears that, as might be expected, the spray proved most effective when the sap was active, *i.e.*, in spring or summer after heavy rains.

Cost.—It was estimated that to spray an acre of land thickly covered would cost as follows:—

80 lb. sodium arsenite, at $3\frac{1}{2}$d.	0 18 8
Application—wages for 1 man and 2 boys	0 12 0
Horse and cart for 1 day ...	0 6 0

As a rule, however, even on badly-infested land, I do not think that the cost of spraying would exceed 10*s*. or 15*s*. per acre, and often it could be done for less.

Sodium arsenite can be purchased in Sydney at $3\frac{1}{2}$*d*. per lb. for large quantities.

Spray pumps suitable for the purpose can be obtained at from about £4 to £10 each, complete. Almost any ordinary spray pump will do, such as those used by the fruit-growers.

Effect of the Spray.—The action of the spray was very rapid, as within 24 hours the leaves were fading, and a strong smell of decaying vegetation was given off. By the end of the first week the foliage had all turned brown, and large numbers of the leaves had broken off and fallen to the ground. *Within from three weeks to a month the foliage had decayed, and was sufficiently dry to burn off rapidly without the aid of brushwood, &c.*

In all cases it was found that none of the chemicals destroyed the roots of the pears, and nearly all the plants made a fresh growth if left undisturbed. If, however, the decayed mass is burned off, there is very little trouble from plants shooting again; and should they show any signs of life, the few roots that do start can be easily removed, as they are only very shallow.

Danger to stock.—In using any poisonous spray for eradicating prickly pears, &c., there is a great risk of stock being killed if they are allowed to graze in the paddock where the treatment is being applied. No matter how carefully the spraying is carried out, the grass near the plants is certain to receive some of the poison, and should stock eat this they may die. If, however, the stock are kept out of the paddock for a week or so, there is little danger afterwards as the poison soon disappears.

Briars, lantana thistles, and other weeds can be treated in a similar way to the pears, and i will be found that the arsenite of soda solution is very effective in destroying them. Also it is a good remedy for eradicating couch grass from garden paths, roads, &c.

COCOA AND ITS ADULTERATION.

[BY AN EXPERT.]

Theobroma, meaning in the Greek "the food of the gods" was the name given to cocoa by the eminent botanist, Linnæus, who could find no language more fit to express the inestimable qualities and the delicious flavour of this food. In Mexico, in the untrodden mould of forests primæval, by the banks of the mighty Amazon, and hidden away under the cool shade of the heavily-timbered glens and ravines, may still be seen this rare and beautiful plant in all its wild luxuriance.

In many parts of the world it is, however, now found under cultivation.

"Historicus" writing on cocoa so lately as 1892, says that the finest qualities are grown in Central America, Trinidad and Ceylon. "The latter is of comparatively recent cultivation, but it is the most delicate in colour, flavour and aroma, and unfrequently commands the highest value in the market."

Ferguson in his Ceylon in 1884 says: "To the late R. B. Tytler belongs the credit of introducing this cultivation, and in his hands Ceylon cocoa speedily realized the highest prices in the London market, experienced brokers remarking that there must be something in the soil and climate of Ceylon peculiarly suited to cocoa." That is so. Our earliest acquaintance with cocoa as an article of diet may be dated from 1494, in connection with the discovery of the western world by Columbus; but its great value was known long before to the dwellers of the countries where the plant grew.

Prescott, in his history of the conquest of Peru, says: "The Emperor took no other beverage than the chocolate. The beverage, if so it can be called, was served in golden goblets."

So early as in the reign of Charles II. medical men recognised its excellence, and a Dr. Stubble wrote a book on it entitled the "Indian Nectar," extolling its "secret virtues" as he termed its nutritious properties.

But it was not long before unscrupulous dealers, even at so early a date in its history, recognised the great facilities it afforded for adulteration; for the elder Disraeli in his "Curiosities of Literature," tracing the cocoa to Mexico, tells us that "the Spaniards introduced it into Europe," but not in its purity, for he adds "it was a coarse mixture of ground cocoa and Indian corn with Racoa."

The adulteration which began then cannot be said to have ceased yet, for some few years ago there were several prosecutions in London, and it appeared upon analysis that there was in some cases as much as 30 per cent. of pure starch added to the cocoa, and to-day can it be said that there

is no cocoa in the market which is not absolutely pure? Neither the rigour of the law nor the vigilance of officials has yet succeeded in suppressing adulteration, and indeed we have to take our cocoa on trust very much as we do our tea, though with regard to the latter article the absence of all mystery about it, and the absence of all necessity to adulterate it at the present day, has given it a consumption which is not likely to be reached by cocoa so long as the public continue to take their cocoa without a guaranteed analysis.

The fact is, the public know very little about cocoa, far less than they know about the fermentation of wine or the brewing of ale; and then as it is quite a common practice among manufacturers to add flavouring agents to cocoa and chocolate, it is by no means a simple task for the ordinary consumer to pick out a genuine brand of cocoa from a host of sophisticated lines found on the market. And so a confection made soluble through chemicals, and bearing a glorified label on an attractive packet concealing a large percentage of starch and other "wholesome" ingredients, may upon analysis appear to be a veritable whited sepulchre. And hence the shyness of the public in approaching cocoa.

There is one test, however, which seldom misleads, and that is the test of colour. Where cocoa deteriorates and falls off in quality and brightness of colour, nothing will bring it back. There is no sophistication possible here, and you could recognise it as readily as you would an Australian aborigine.

The London brokers' highest quotations are for what is known in the trade as "bright bold," and with this brightness is invariably associated flavour, freshness, perfect curing, &c.

On every plantation there are well-cured and ill-cured samples. There are beans picked up from under the trees by the bushel—daily dropped by squirrels, and already black before they can be handled by the planter. There are also samples spoiled by rain, as well as hard unripe beans from "cankered" pods. To all these no art can give back their lost colour, although benzoin and vanilline may substitute a flavour. Yet these are sold and shipped, and what follows is all a mystery.

Ask the doctor and he will explain the reason why he recommends the cocoa "nib" to his patients, and directs them to make their own decoction. Solubility of a powdered cocoa may be secured at the cost of quality and wholesomeness, for it is well known to the initiated that with the aid of tartaric acid and carbonate of potash, coupled with the retention of a part of the butter in the cocoa, a thick, creamy and most attractive sample may be produced. But the eminent scientist, Dr. Hart, referring to such a product, has told us that we should remember potash combined with fat is commonly called soap. And no wonder that, what between starch on the one hand and chemicals on the other, consumers are often heard to assert that they like cocoa but they get bilious over it, and have to discontinue the use of it after a while.

Ignorance regarding this most wholesome food is not confined to the general public alone. The most educated and enlightened may be often found in the ranks of the deluded. Once an amiable but credulous physician of some distinction, speaking to the writer about cocoa in Ceylon, and the superiority of the article prepared by the Spanish and Portuguese, was relating how a Catholic priest in Ceylon had offered him such a luscious bowl of cocoa that the spoon might have been made to stand in it. The writer unguardedly interjected "Chiefly starch!" for it was that, or both starch and the fat of an indifferently cured sample that gave it the consistency. The physician and the writer have never met since, but the priest who holds to his particular gruel as he upholds the dogmas of his creed, and the doctor who is by now the guardian of that jovial monk's liver, are disseminating the gospel of their own "Societas de propaganda fide" from high places.

A well-known confectioner, who may be said to hold in his hands the four corners of Western Australia in that time, expressing his opinion on a sample of Ceylon cocoa sent to him at his request, wrote back: "Its flavour is most excellent, but it is not dark enough for this market."

It was soon explained to him that colour and flavour are correlative, and went together or disappeared together, and he is now ordering his supplies largely from Ceylon, and doubtless educating the Australian eye to the true colour, and the palate to the genuine flavour of pure cocoa. One more illustration. A Ceylon newspaper, referring last week to the "*German Export Review*" says: "A recent number contains an excellent paper on the manufacture of chocolate with a series of very interesting illustrations so far as the machinery &c. go, but there is also the inevitable "cocoa plantation, and instead of this being a grove of Theobroma Cacao, it is simply a coconut palm garden."

Ye gods and little fishes! What confusion is here. For when the oil of the coconut is expressed, what is left is "poonac," the favourite food in Ceylon of cart bulls and pigs, and when the fat is taken out of the other what is left is the food of the gods!

These illustrations are intended to show the public how widespread is the general ignorance which prevails all the world over with regard to this remarkable article of diet, and it is deplorable to think that its popularity in many cases is retarded one way or another by the makers themselves. The general unwillingness to partake of it as liberally as we do tea or coffee no doubt arises out of this ignorance, and the doubt and suspicion in the public mind as to the purity and genuineness of the article offered for sale.

One may, however, venture to assert that if the public were made better acquainted with the manufacture of cocoa, and the makers agreed among themselves to drop their mysterious declarations and rival claims for specical preparations, and substituted instead a simple certificate of the chemical analysis of their produce, cocoa may speedily become as popular a drink at our breakfast table as is the homely Ceylon tea, about which there is no mystery, and to which nobody

sets up any exclusive claims of superiority arising out of secret methods of preparation.

The highest claim a manufacturer should make regarding cocoa is that having expressed the expressible oil, he is content to leave well alone. It were vain to attempt "to paint the lily or guild refined gold"!

SERICULTURE.

In cur last issue we had something to say about the proposed introduction of Sericulture as a village industry. The *Indian Agriculturist* for June in referring to the encouragement which His Excellency the Viceroy of India is giving to industrial work, goes on to give an account of the progress made with Sericulture, Apparently the rearing of silkworms exactly suits the tastes of the Indian peasantry, to judge from the manner in which Sericulture has been taken up, not casually but on sound scientific lines; and this fact should give encouragement to those who are endeavouring to popularise silkworm culture in Ceylon. The following extract will give an idea of the progress of Sericulture in Bengal:—

The Government of Bengal, acting in conjunction with the Bengal Silk Committee, have done useful work in introducing improved methods of rearing silkworms, and the industry has now been placed on a sounder footing. The chief evil which threatened to destroy the industry was that of diseases affecting the silkworms. The principle disease is known as pebrine. It is hereditary, affecting the blood of the worm and has the effect of killing the werm attacked when just about to spin its cocoon. Impressed by the wonderful results secured on the continent by the adoption of the Pasteur system of silk rearing and disease prevention an effort was made to introduce it into Bengal. The Silk Committee consists of representatives of three European firms in Berhampur, and the Collector *ex-officio*. At the outset of the Committee's operations they were not particularly successful but persevering in their efforts to see the Pasteur system given a fair trial, they now have the satisfaction of witnessing their labours attended by more satisfactory results. The Government of Bengal contributed Rs. 3,000 annually towards the experimental work that was being carried on, and this year the grant has been increased to Rs. 6,000, on condition that the Committee raises a similar sum.

Incredible though it may sound, there is no doubt that, especially in the Malda District, where the people are more intelligent, the Pasteur system is practised with excellent results by mere peasants to whom the microscope and bacteria were but a short time ago unmeaning terms.

Starting then with the female moth that has been placed in a position to lay fertile eggs, these eggs hatch out in about a week, and the worms are carefully taken by the rearers and placed on big bamboo trays. The worms are fed on mulberry leaves for varying periods according to the time of year, as long as forty days in the cold weather, until the expert rearer by their appearance judges they are about to spin a cocoon. At this stage the worms are placed on a spinning tray called a *chandraki*, which has running from the outer edge of the centre in spiral form little hedges of wicker-work some three inches apart. Five hundred or six hundred worms are accommodated on one of these trays, and here they soon start to work, spinning around themselves what proves in their case a shroud of silk.

On the moth hatching out and being ready to lay eggs, it is placed by the rearer inside a small circle of tin with a piece of paper underneath on which it lays its eggs. Pebrine being a hereditary disease it follows that the eggs of healthy moths only should be retained. To determine the existence of disease in the blood of the moth the microscope has to be brought into requisition and the fungoid growths are so marked that with a little preliminary training it is apparently easy to distinguish between the healthy and unhealthy moths. In the case of the latter both eggs and moths are burned or buried without loss of time, eggs of the moths free from disease alone being retained.

In addition to the microscopical examination of seed the Silk Committee have built three rearing-houses. The results have so far been most satisfactory. The produce of silk per unit of cocoons reared at Chondonpur has been 40 per cent. greater than that of native reared cocoons. One of the houses which the Committee is building will be divided into two compartments, one having ruby and the other violet coloured glass windows. The use of ruby glass excludes the actinic rays, and worms raised under this condition are said to develop more perfectly than when reared in the ordinary way. The object of the violet glass is to destroy microbes inimical to the health of the silkworms.

All this goes to show that Sericulture in India hsa come to be a regular "business." And why should this not be the case in Ceylon also?

CASTRATION

[BY E. WALLIS HOARE, F.R.C.V.S.]

The operation of castration appears to be regardedas one of vast importance in veterinary surgery. Nearly every practitioner fancies himself an expert on the subject, and proclaims that his method is superior to all others. Some, with an exaggerated idea of their own skill, tell us that so successful are they at the work that no colt ever dies as the result of their operation

At one time, in the simplicity of youth, we used to regard such individuals with awe, and a touch of envy at their success and our misfortune when a case slipped through our fingers, and we got the credit of slaying the animal. But as years rolled on we gradually learned that these succesful men had similar experiences to our own, with this difference, however, that in our case we attributed the cause of death to the operation, in their case it was a calamity resulting from some disease that was lurking in the system

prior to the operation. And not only this, but, *mirabile dictu* they were able to persuade the owners that such was the case, while our reputation was hanging in the balance, and we were anathematised as having caused the death of the rent-payer of the farmer or the pride of the widow. Indeed, not so long ago we saw it reported that the cause of death in one case that succumbed was the attempted swallowing of the testicle that was left in the animal's stall!!

One would imagine that some great surgical skill was required in the operation if we consult recent works on veterinary surgery. In a work recently issued we find no less than thirty-nine pages devoted to this operation, different methods being given, and plates of instruments, and some implements belonging to a former age. For such a simple operation it is surprising how much space is occupied, and what a number of barbarous methods are described. We beg to assert, however, that a student would learn everything about the operation after assisting a practitioner of modern views, and that he might read the descriptions given in the thirty-nine pages *ad nauseam*, and be totally unfit to castrate even a donkey.

Let us for a moment inquire into the essentials of the operation. In normal cases the proper securing of the spermatic artery, in order to prevent hæmorrhage, and the after-treatment, which consist in measures for the prevention of septic peritonitis and tetanus, comprise the important details.

That the operation, by whatever method employed, is a simple one, is apparent when we consider the large number of animals mutilated by empirics, and the small percentage of fatal results. As regards fatal results and untoward complications, the element of chance enters very largely. Sometimes even with the greatest care a fatal result will occur, and no one is to blame. Again, we find that, as a rule, cases do better when on grass every day than under the best hygienic surroundings and surgical care in town, of course provided the weather is suitable.

As to the method of operation, modern practitioners prefer one on surgical lines. Certainly the antiquated clam and the hot iron are not in accordance with modern surgical ideas, in spite of the dogmatic assertions of those who pin their faith on ancient methods. The method by torsion and that by ligature are both scientific and surgical, and our experience of the former leads us to state that it is perfectly safe and expeditious. We do not, however, agree with the illustrations given of this method in modern text-books, as it is essential to apply the torsion forceps as close as possible to the surface of the clamp, in order to operate in as short a time as possible, and to avoid leaving a quantity of bruised tissue behind. Some of the instruments illustrated in works on veterinary surgery are exceedingly crude for this operation.

The hot iron and the clam have a strange fascination for many practitioners. These barbarous methods are adopted by the travelling castrators, we presume, in consequence of a superstitious belief in the efficacy and in the simplicity of their manipulation. The qualified man, however, should not be influenced by such considerations.

It has been stated that the results of the hot iron are more favourable than those by other methods; but we would like to inquire how such results are arrived at, as we are not going to accept the *ipse dixit* of the individual on the matter, or draw conclusions from his results of the different methods of operating.

The devotee of antiquated surgical methods resents violently if his deductions and handiwork are criticised; but as "old customs die hard," we are not surprised at this.

Veterinary surgery is bound to progress with the times, and not lag behind to follow in the trail of human surgery. As an example, we may mention the employment of chloroform, which, although by no means as largely used in veterinary surgery as it should be, still, aided by the humane owners of animals, its use is becoming more general. We take it as a sign of the times when owners of animals insist on the employment of anæsthetics, but we do not consider it altogether to the credit of the profession that such a request should be necessary.

With regard to castration, we were told more than once during a long paper discussion that it would be impossible to carry out anæsthesia, and the most trivial excuses were put forward. What was the result? Every excuse that was mentioned was proved to be imaginary, and any one who has operated with the patient under chloroform will continue to use it. Prejudice and a want of practical knowledge of the employment of anæsthetics are the real causes for their use not being general. So long as prejudice exists, a want of knowledge is sure to continue, with its attendant train of erroneous ideas.

A long experience of the method of castration by torsion enables us to draw attention to some important details in connection with the operation. We do not claim that no unfortunate sequelæ follow this method: as we have already remarked, the element of chance enters largely into the results, no matter what method be adopted. No doubt the condition of the animal has a great deal to do with the results; if his constitution be sound and fit, he has a far better chance of doing better than under the opposite circumstances. After all it is simply a question of the healing of the end of the spermatic cord and of the operation wounds; and, just as in wounds of other regions, if the animal's constitution be unhealthy or out of condition, and if the surroundings are unfavourable, we cannot expect satisfactory results.

Aseptic castration we look upon as impossible under existing circumstances and conditions. No doubt attempts may be made to bring about such a fortunate state of affairs by those who are not engaged in the routine of daily practice; descriptions of the attempts also serve to embellish the chapter on castration in works on modern veterinary surgery.

While we can never hope to perform this operation under conditions similar to those in human surgery, and with the same results, still we must as far as possible pay attention to antisepsis and surgical cleanliness. We can at least have our instruments aseptic by taking the precaution of placing them in boiling water; we can also have

the instrument tray aseptic, and the vessel containing the antiseptic solution in a similar condition; we can to a certain extent disinfect the skin and surrounding parts of the field of operation; and, last but not least, we can render our hands aseptic.

Next comes the great difficulty and drawback to our efforts, viz., the surroundings and the attendant. Our experience has been, that provided the weather be favourable the animals are far better on grass than in the best-formed stable, also that the less handling they receive from the attendant the better. Of course no hard and fast rule can be laid down on the subject, and while some give no trouble, without any attention from the attendant, others require to be looked after. With very few exceptions do we find buildings which are fit to accommodate surgical cases, certainly not in country districts where the majority of colts are housed after the operation. Many are filthy in the extreme, and even the aid of a Hercules would not render them clean enough to satisfy our minds. Still we have to make the best of our surroundings, and endeavour to have them cleaned and disinfected as far as possible. As regards the ordinary farm attendant's hands, we imagine that even prolonged boiling would hardly sterilise them. Under such circumstances we cannot be surprised when bad results of the operation follow, a combination of dirt and rough handling being opposed to natural healing.

Taking everything into consideration, we may state that the results obtained are very satisfactory, and that the unfavourable sequalæ to which we shall shortly refer can to a great extent be minimised or prevented. Given an animal in healthy condition, and surroundings as favourable as can be expected, the next important point is with reference to casting for the operation. Of course all necessary precautions must be taken, as in casting for any operation. We may state that we prefer casting with small-sized hobbles, and performing the operation with the animal lying on the side, the uppermost hind leg being released from the hobble and secured towards the shoulder by means of a side-line. Needless to say, we administer chloroform to animals of all ages, and have no trouble, danger, or anxiety from its use. Next with reference to the instruments. We use a special clamp, with edges that fit accurately like an artery forceps. The testicle is exposed in the ordinary way, the so-called non-vascular portion of the cord is severed by means of a pair of scissors with serrated edges. This precaution prevents hæmorrhage from the small testicular artery. The clamp is then fixed on the vascular portion of the cord as high up as possible, without dragging on the latter, and the instrument is closed as tightly as possible. The torsion forceps are then applied, and if the testicle be large it is removed a short distance from the forceps. We apply the forceps as close as possible to the surface of the clamp, and then rotate the forceps slowly and regularly, the first few turns being more rapid; by this means no bruised tissue is left behind, and the operation is more expeditious. We never permit an assistant to hold the clamp, as we can do so ourselves, and perform torsion with facility. The important matter is to avoid any dragging on the cord.

In the case of yearlings, if we operate in the country we leave them on the grass at once, provided the weather is favourable; of course, they are housed at night for a variable period. In two-year-olds and upwards we keep the animals inside until next day, then leave them on the grass, and make certain they have at least an hour's exercise daily. The importance of daily exercise cannot be over-extimated.

The sequelæ of castration we are all unfortunately too well acquainted with.

Hæmorrhage, either primary or secondary, will sometimes occur in spite of all precautions. Although we have never known a case that terminated fatally as the result of hæmorrhage, still it is our experience that colts which bleed after the operation do not progress favourably, and frequently develop other sequalæ. The source of the hæmorrhage is not always easy to discover, but in yearlings we have often observed that the small testicular artery is very well developed, and we are of opinion that the hæmorrhage arises from this vessel. If this portion be severed by means of a serrated scissors instead of a knife, there will be practically no hæmorrhage. In weak yearlings we have found it of advantage to place the entire cord in the clamp, and sever the non-vascular portion on the surface of the instrument before applying the torsion forceps. It is rare to encounter hæmorrhage immediately after the operation; of course, some animals bleed more from the scrotal incisions than others, but this soon ceases.

It is hæmorrhage occurring from two to six hours after the operation that is likely to cause trouble. As regards its suppression, much depends on circumstances. If the bleeding be only slight, the application of cold water may help to bring about a spontaneous cessation; but if profuse, especially with evidences of arterial bleeding, we must resort to plugging the canal, and the best material is carbolised tow pushed in firmly in pledgets. This has always succeeded, but we must admit that next morning there is always enormous swelling, and a tendency for a recurrence of the hæmorrhage when the pledgets are being removed. It is astonishing the tendency to hæmorrhage possessed by some animals; we have seen intermittent hæmorrhage to last for three days, and recur in a continuous drip every time the pledgets of tow were removed. One important detail is not to allow the packing to remain in too long, as it very quickly becomes septic. At the same time care is required in removing it. One of the most troublesome cases of bleeding we ever encountered was when acting as assistant. The animal, a large yearling, was castrated the previous day by another practitioner. By chance we happened to be passing by, and found the groom in a great state of alarm; the blood could be heard gushing in a firm stream. No appliances were at hand, and not even tow or wool. We came across some alum and dissolved it in cold water, and applied

same diligently, and sent to town for the operator. When he arrived the hæmorrhage had ceased spontaneously, and the animal made a good recovery, although having lost a large amount of blood.

It is a point worthy of note that in bleeding after castration the animal generally keeps the hind legs moving and frequentaly disturbs the clot, and so favours a continuance of the hæmorrhage. When hæmorrhage does occur it is absurd to attach blame to the operator; in spite of every precaution it will occur in some instances, and we believe that a similar result would ensue from a wound in any other part of the body.

We are aware how profuse is the hæmorrhage in some animals after the operation of docking, and how difficult is its suppression. If asked what suggestions we would give in the prevention of this annoying sequel, we would say:—

First. Avoid exciting the animal before operation, and have him cast as quietly as possible.

Secondly. In weak animals, take especial care in twisting the spermatic artery, and in every instance see that the animal gets an opportunity of rising without knocking himself about. Do not walk him immediately after the operation, but keep him at rest so as to give the arteries a chance of being properly sealed. On no account permit an animal to be walked home the same day if it is any distance. The owners of animals usually exaggerate the extent of bleeding, and become very much alarmed at a small amount of bleeding. Our experience teaches us that in many instances the bleeding will cease spontaneously without any plugging, and the latter is certainly to be avoided if possible.

In our next article we shall consider some more sequelæ of castration.

THE COCONUT PLANTER ABROAD.

One of the greatest troubles of Coconut growers on the river has hitherto been the destruction caused by the natives, who cut step in the trees to reach the nuts. The trees never bear after this mutilation. They have, however, had it explained to them that they are "killing the goose that lays the golden eggs" by this proceeding, and further more that it is very displeasing to the white residents. They have consequently promised not to do this for the future, and will not allow their picaninnies to do it, so that now there is very little danger of loss by coconut planters.

When planting the nuts, all the protection they get is three stakes driven into the ground round the spot to keep off horses. In cases where there is danger of fire, sweet potato vines are planted about the young trees, which are thus quite protected from that element. Once the trees have made wood, cattle and even goats may be allowed amongst them, as they never touch them, and trees under which cattle camp thrive better than others.

In planting coconuts, Mr. Pentreke says:—"I shall in future always plant them in an upright position with the eyes uppermost. The reason is that when a tree is sheltered, the nuts will remain in their place till the germ pushes the nut off (unless it is forced by some extraneous cause), and if in falling it strikes the sand or soft earth, it will stand upright and grow into a straight upright tree. The nuts only turn on their side when they fall on hard ground. When the nuts stand in the natural, upright position, the gases or volatile oils float on the top of the contained liquid near the embryo, which liquid and oils serve the purpose of lubricating the kernel near the seed, and supply the germ with its first food, and continue to do so till the young plant makes its appearance on top. Crooked growing plants should be removed as they indicate the first stage in degeneration."—*Queensland Agricultural Journal.*

If the "cutting of steps" by the natives (ready to obey when told not to do it again) is the greatest trouble of the Coconut Planter in Queensland, then the Queenslander is fortunate, as also in having so effectual a means of insurance against fire in the sweet potato plant. But the scientific explanation of the advantage of planting nuts upright, viz., to bring the embryo within the influence of the "gases or volatile oils" which "float on the top of the contained liquid" is something new even for Ceylon.—ED. *A.M.*]

GENERAL ITEMS.

The *Station, Farm and Dairy* of June 12th referring to the variability in the composition of cows' milk, says that there are many causes for variation as conclusively shown by a series of tests carried out by the Highland Agricultural Society (Scotland) where 700 analyses were made of the milk of 18 cows during a period of 21 days, each cow's yield being collected and analysed, separated both morning and evening. Samples containing less than 3 per cent, or even 2 per cent, often occurred, and a few days later tests of the milk for the same cow would give 5, 6 and 7 per cent of fat. Of course the average milk of a herd would not vary so greatly, but according to the best authorities tests might go more than 30 per cent above or below the average for the year. It was found in England that the average of a herd during drought was much lower than the same period in the previous year. Variation might be classed as due to three causes: (1) those that are natural and progressive, (2) those that are accidental and usual temporary, (3) those that are unknown.

Oxalis Crenata, the "oka" of the Peruvians, is spoken of as a vegetable worth cultivating, though not likely to take the place of the "tubers" already in cultivation, such as sweet potatoes or artichoke. Sir W. Thistleton Dyer referring to it says:—"The tubers should be planted 3 feet apart in sandy soil and treated like the potato. New tubers are formed at the end of the season, and under favourable conditions they are 3 inches long and weigh 2 oz. When lifted they should be exposed to sunlight for 2 or 3 days. To cook them boil for 20 minutes in water containing a pinch of carbonate of soda; they then turn into a

bright amber colour, and if eaten with pepper and salt they are palatable and of pleasant flavour." Another closely allied species is *O. esculenta*, the tubers of which are cooked in salt water and served with melted butter and cream.

———

The following appears in the *Victorian Agricultural Journal*:—Beyond acting as a support, wood is not actually necessary to the life of bark and leaves. Any cylinder of bark from which the wood has been skilfully removed will, if its sides are carefully closed against air, go on growing and deposit new layers in its inside until a centre of solid new wood is formed. This applies only to exogenous trees, or such as increase their diameter by depositing new layers on their exterior. Such are all our fruit trees, and when it is realised that the entire life of the superstructure is wrapped up in the bark, the need for careful and systematic attention to this substance is not to be over-estimated.—This statement is apt to mislead those who know no distinction between the heart wood and sap wood, for it cannot be said the sap wood is not necessary to the life of the bark and leaves. But of course the object of the above statement is intended to impress upon those, who are apt to think little of the bark of a tree, that it is not the least important part of the stem structure. The agent that is really responsible for the deposition of new layers of wood tissue is the cambium which lies between the wood and the bast, or the inner part of the bark.

———

Mr. A. Crawford, an authority on poultry, in reply to the question how much food should be given daily to fowls, writes to the *West Australian Journal of Agriculture*:—This is rather difficult to reply to, for so much depends upon the breed and the surroundings; in some places the fowls can pick up nearly their whole living when running about, while in others they are entirely dependent on what is given to them. Then there is the difference in the habits: some breeds are good hunters, and extremely active, always on the go in quest of what they can pick up, and will wander far afield, while others will hang round the homestead or sit in the shade waiting for food to be thrown out, and even when neglected do not seem to have the sense to try and make a living for themselves. Then again, there is the matter of size to be taken into consideration: a Leghorn or Hamburg will not eat anything like as much as an Indian Game or Cochin, but if we take ordinary fowl of moderate size, the following ration would be about an average of their requirements:—For breakfast, from 3½ to 4½ ounces of soft food such as pollard, bran and pollard, pea meal, bean meal, oatmeal, etc., and for the evening meal from 2 to 2½ ounces of grain; always remembering that it is better to rather underfeed than overfeed.

———

The *Journal of Agriculture*, West Australia, does not approve of the application of lead paints and similar preparations for healing the wounds, but recommends vegetable oils, lard or other animal fat or grafting wax, which it thinks sufficient to keep out disease germs, insects, toadstools and extremes of heat and cold, so that any sap brought to the margin will remain active and form new bark. Wounds when intentionally inflicted (as in pruning) should be as smooth and clean as possible to induce quick healing.

———

Says the *West Indian Bulletin*:—Uncooked sweet potatoes may be sliced and then dried either in the sun or in evaporators. They are prepared for the table by soaking and baking. Dried sweet potatoes were exhibited among the products of Japan at the Columbian Exposition. Their preparation is described as follows:—"Cleanly washed potatoes are placed in a suitable basket and immersed in boiling water for a short time; when taken out of the basket they are cut into thin slices and spread over mats and exposed to the sun for two or three days. In order to make a superior quality, the skin of the potato is peeled off before slicing." As an indication of more recent developments it may be mentioned that a company has been lately started in New Jersey, America, with a capital of 1,000,000 dollars, to make flour from sweet potatoes. The early results are reported as being very successful, and it is proposed to erect mills all through the sweet potato growing region. The more important States in this region are North and South Carolina, Georgia, Texas, Alabama, Mississippi, Virginia, and New Jersey.

———

Mr. Clark Nuttal writing in *Longman's* about the banana, gives us some idea of the increasing trade in the fruit in the following extract from his interesting paper:—The coast of Hondurus is a great centre of the export fruit trade, but in 1883 one little schooner was sufficient for all the requirements in the way of transport. Now three lines of steamers and sixteen sailing vessels barely meet the demands made upon them, the greater part of the fruit they carry consists of bananas. The cargo of a steamer may be anything between 8,000 and 15,000 banana bunches; hence it is obvious great numbers are exported yearly. The West Indies, Cuba, Costa Rica, and Central America generally tell the same tale of increasing trade. From Jamaica alone we get millions of bunches now every year.

———

The fruiting of the "Male" papaw tree is the subject of a special note and illustration in the *Queensland Agricultural Journal* for May. The phenomenon—if it could be called so—is familiar enough in Ceylon where the papaw is so plentiful, but the fruit, as an inferior product, is looked down on—in fact never gathered. The papaw is as a rule diœcious, but when the "Male" bears, as it sometimes does, seeded fruits, the term male tree becomes a misnomer. The fact is thatthe papaw which is generally diœcious exceptionally bears hermaphrodite flowers on the "Male" trees.

———

We read in the same Exchange of the suitability of Queensland for cinnamon, which, however, appears to have a deadly enemy in the shape of a black beetle that attacks the young plants.

———

Banana bread made from the flour is now available in Chicago, and is voted excellent.